

## *Second Thoughts*

### UMBRELLAS AND LIONS

DOUGLAS R. ANDERSON\*

Bascom Palmer Eye Institute, Department of Ophthalmology, University of Miami School of  
Medicine, P.O. Box 016880, Miami, FL 33101, U.S.A.

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#### INTRODUCTION

The modern prospective randomized clinical trial is a powerful tool for showing cause-and-effect relationships, in particular the outcome of an imposed antecedent condition. In clinical studies, where it is used to show the benefit of certain therapies, it is at the same time the most ethical way to show conclusively whether a certain treatment is effective, or more effective than another, while placing the fewest possible number of subjects at risk of receiving a sub-optimal management.

An ethical problem arises, however, when an investigator believes strongly that he knows the answer. In that case his conscience should not permit him to assign subjects to what he knows to be the less optimal circumstance, especially when the outcome involves life-or-death. Each participating scientist must agree in his own mind that there is doubt. An investigator cannot assign half of his subjects to what he believes to be the risky arm of a prospective trial even though someone else may believe it to be the safer arm.

In this circumstance, one must look for an alternative method of scientific proof. The nature of a longitudinal, or prospective, clinical trial is that it is prospective. The individual is assigned to one or another group, and with follow-up the outcome is observed. The alternative is to perform a case-control study, in which two groups with different outcomes are col-

lected and the precedent conditions that led to the two outcomes are analyzed. This report is intended to illustrate the use of such a study design to answer life-and-death questions. Particular attention should be paid to the effort to collect a control group that had an exposure to risk that is equally as great as the group with the unfavorable outcome.

The case in point is the lion-repellent property of umbrellas, which I have studied for over a decade. It began when my daughter asked one sunny day why I was carrying my umbrella. I pointed out to her that while carrying it I had never been attacked by a lion. She was dubious of the effectiveness of my strategy, but it must be kept in mind that this same child had grown doubtful of other clear laws of nature, even though stated authoritatively by her father, a scientist who had achieved the rank of full professor with tenure at a university. For example, just the week before I asked her if she had noted the well-known law that what goes up must come down. "No, Dad!" she replied, "Balloons filled with too much air never come down". (Not long thereafter she also pointed out that her brother's model rocket was blasted upward into the blue yonder and was never observed to obey the "law" that it must come back down.)

It was evident that this child had learned that proper scientific empirical observation is a better source of truth than the statements of authority. Because of this I have spent more than 10 years collecting evidence to prove the lion-repellent properties of umbrellas. An observation of

\*The author has no proprietary interest in any company that manufactures, distributes, or sells umbrellas.

spontaneous events of case-control design was required because the IRB would not approve a randomized controlled prospective experimental trial of the hypothesis at the local zoo, although such an experiment would have proved this important life-saving property of umbrellas in much less time. (The study would have been unethical for me anyway, as I would not want to subject any participants randomly to the risk of being umbrella-less in the presence of a lion.) Now finally the data are gathered, are subjected to statistical analysis, and can be reported. They should be particularly convincing to my daughter, now a college math major studying statistics. The publication of the results in a scientific journal will clinch the validity of the conclusion.

#### MATERIALS, METHODS AND RESULTS

The first data set is a literature review, which revealed no reported cases in which a person attacked or chased by a lion was carrying an umbrella. That's *zero* in 298 sources that report one or more lion attacks.

This phenomenon is a general one, not limited to a particular geographic region or a particular time in history as exemplified by these selected examples. In old testament times Samson, when attacked by a lion (which he successfully overcame), was not carrying an umbrella, which had not even been invented in its modern form. Christians did not have umbrellas to repel the lions when they were thrown into the Roman arenas. Although novels are fictional, they certainly represent a portrayal of the nature of life as known by the authors, so stories of adventures in Africa can be taken as evidence of how life was in that region at that time. At particular risk, it should be noted, were the Christian missionaries, their families, and the native converts who worked at the mission. In all such stories the victim of lion attack never had an umbrella at his disposal. Last year's newspaper report of a child being killed by a lion at the Dallas Zoo made no mention that he or his would-be rescuers had an umbrella.

Excluded from the data set was the story of Little Black Sambo, who was also not carrying an umbrella, but the animal in this encounter was a tiger. Though this story is closely related evidence, I wanted to include only pure examples in the statistical analysis.

Of course, lion attacks are sporadic events, though sometimes in clusters, so control obser-

vations are needed to establish statistical significance of the protective properties of umbrellas. Having noted that Christians have been at particular risk, I set about to determine the frequency of umbrella-carrying among this group while not under attack by lions. Several criteria have been proposed for judging whether or not a particular individual is a Christian (or a "true Christian", in some systems of terminology), but for the purpose of this study we defined a Christian as any individual who on a Sunday morning parked a car in the vicinity of a church and entered the building.

Counts were made on 207 Sunday mornings outside a sampling of 16 churches of 7 denominations. A total of 20,643 Christians (as defined) were observed, and 2241 (10.9%) were carrying umbrellas. (The percentage on a given day ranged from 0 to 88% and seemed related to the weather, though weather records were not kept and statistical proof of the suspected correlation cannot be calculated. This may prove a worthy subject of a future experiment.) Despite the sizeable sample, none were under lion attack.

Analysis of the data is as follows. In some of the 298 reports of lion attacks, many individuals were affected (even hundreds, in the case of Christian martyrs or during attacks in native African villages). As the cases are not all enumerated, and in any event do not represent independent observations, I decided to accept only one victim per reported occurrence, so 298 is a minimum number of lion attacks on non-carriers of umbrellas. The  $2 \times 2$  table that results is:

		<i>Lion attack</i>	
		Yes	No
<i>Umbrella carrying</i>	Yes	0	2241
	No	298	19,402

Chi-square analysis shows a very highly statistically significant difference ( $\chi^2 = 34.38$ ,  $p < 0.001$ ). Thus, 0% of cases of those attacked were umbrella-less, but 10.9% of the control group were carrying umbrellas. Thus, in the terminology of case-control studies, being umbrella-less is a risk factor seemingly with an infinite relative risk. Following the procedure of adding 0.5 ml to each cell in the table (because of a null cell), we can estimate the odds ratio to be 69:1. (From the perspective of food for the lion, this might be called the "odds ration". Ed.) Even permitting that the 95% confidence limit of 0 cases of 298 is 1%, the relative risk is

at least 11:1. Couched in intuitive terms, nearly 11% of the population carries umbrellas, and if lion attacks were random, then 11% of those attacked by lion should have been carrying umbrellas. But *none* were, and the likelihood that this difference is coincidental is calculated to be  $<0.1\%$ .

#### DISCUSSION

It should be noted that the phenomenon being reported here is that an umbrella is a repellent that actually *prevents* lion attacks. It is not claimed that it is a weapon that terminates an attack when used as a weapon, for which purpose it may be only partially effective and dependent on the skill and strength of the wielder. Thus, it is important that the umbrella be carried by the potential victim and not provided to him by a bystander after the attack begins. Not only is the delayed provision of an umbrella ineffective, but it leaves the bystander now umbrella-less, at great risk if he remains on the scene.

The repellent effects may apply to other wild animals (polar bears, rattlesnakes), but this speculation must await confirmation in a separate study. In my experience, however, the umbrella is not an effective repellent of certain domesticated animals, specifically neighborhood dogs. Against such animals, however, the umbrella *does* serve as an effective weapon if the dog is small enough, though certain pesky ones will retreat only two-umbrella lengths away and bark furiously. In such cases you must *back* away beyond whatever territorial limit has been set by the animal. You cannot turn to walk away front-ward. Your heels will

be bitten. My biostatistical consultant (William Feuer, personal communication) has heard of a hiker who frightened away a bear by opening up an umbrella in its face. In a sense the umbrella acted as a repellent, but its usage here was weapon-like, requiring action on the part of the umbrella-carrying hiker and resulting in a retreat by the bear. The thesis of this paper is not that the umbrella is a weapon when it is used actively, but that simple passive carrying of an umbrella will keep lions from even approaching. Q.E.D.

#### CONCLUSION(S)

Choose your own, as many as apply:

1. Always carry an umbrella.
2. "Stuff and Nonsense!" said Alice [in Wonderland] loudly.
3. "The conclusion is stupid. Therefore you know there is something wrong in the study design. Probably the other things you publish have the same error in study design, but your conclusions are accepted because it's not so intuitively obvious that the conclusion is wrong."—My children.
4. Lions attack only on sunny days, when normal people don't carry umbrellas. Rain, not the umbrella, is the repellent.
5. There must be an alpha-type error here. Though the probability is low, the result could have been obtained by chance. The lottery is sometimes won.
6. Christians should carry umbrellas not only for their physical welfare, but also for their spiritual welfare. "Your adversary, the devil, roams about like a roaring lion seeking whom he may devour."—1 Peter 5: 8.