

HUMAN
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Multiple Analogies
in Science
and Philosophy

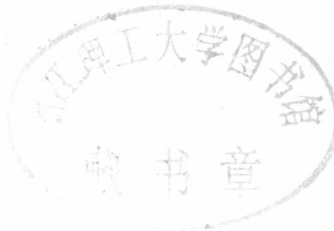
Cameron Shelley



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Multiple Analogies in Science and Philosophy

Cameron Shelley



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Preface

If you were Monica Lewinski's mother, how would you describe Linda Tripp? Remember that Linda Tripp is the woman who tapped her own phone conversations with Monica and then used them to incriminate President Clinton. Marcia Lewis, Monica's actual mother, chose the following expression: "She is like a meddlesome witch, a praying mantis." This expression conveys a *multiple analogy*, a comparison in which several sources are likened to a target. In this case, the first source tells us that Marcia thinks of Linda as a disagreeable woman who entices youngsters into her confidence in order to ensnare them for nefarious purposes, much like the witch who trapped Hansel and Gretel. The second source tells us that Marcia thinks of Linda as a creature that ambushes others out of an inhuman lust for prey.

This example shows the usefulness of multiple analogies in satisfying certain cognitive goals, such as constructing an adequate explanation of Linda Tripp and her behavior. Multiple analogies have also proven to be very useful in satisfying other kinds of cognitive goals, such as those of philosophers and scientists. However, no cognitive model of multiple analogies has yet been proposed or explored. This book presents an exploration of multiple analogies as found in the literature of evolutionary biology, archaeology, and philosophy with the aim of proposing a cognitive model of this interesting mode of reasoning. This model is based upon the *Multiconstraint theory* of analogies, which is extended for the purpose, and also contrasted with previous theories of analogy.

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CHAPTER 1

The problem of multiple analogies

Gladiators were to be watched and admired because they went to their deaths without flinching. ... [Combat] began in the morning with the animal shows. Entire landscapes would rise from the underground scenery docks, and then in would come the exotic beasts – lions, tigers, leopards, crocodiles, elephants. It was a sort of cross between a zoo and a snuff movie.

Terry Jones, *The Times of London*, 20 August 2000.

1.1 Introduction

An analogy is a kind of comparison that may occur in many contexts, serve many purposes, and take on many forms. Consider, for example, the remarks made by Prince Philip, the Duke of Edinburgh, on the demand for a ban on handguns in Britain following the shooting of 28 schoolchildren (16 fatally) in Dunblane, Scotland in March 1996. The Prince argued against the ban by comparing handguns to golf clubs and cricket bats:¹

If a cricketer, for instance, suddenly decided to go into a school and batter a lot of people to death with a cricket bat, which he could do very easily, are you going to ban cricket bats?

The Prince's comparison displays a number of features of central importance in analogical reasoning. First, the comparison is constructed with a specific purpose in mind, namely to weigh against proposals to ban handguns. Such a ban in the case of cricket bats would be absurd, the Prince maintains, so it would also be absurd in the case of small arms. Second, the Prince bases the argument not on any obvious similarity between handguns and cricket bats, which look nothing alike, but on their (potential) similarity of use. Both, the Prince claims, lends themselves well to homicide. Third, the Prince's choice of cricket bats for comparison was made within a particular context. In fact, he was being interviewed by a BBC radio sports reporter when he made the remarks. Thus, sports, especially ones such as golf and cricket that are familiar to the Prince, were primed by the circumstances of the interview. Fourth, the leisurely and

rule-bound air associated with golf and cricket contrasts highly with the speed and shock of a sudden mass shooting. Finally, the Prince mentions cricket for comparison not simply for its own sake, but also on behalf of other sports and sporting equipment, such as golf and golf clubs, which suggest the very same conclusion.

These sorts of issues arise in the consideration of any analogy. Analogies generally serve some purpose or purposes, of which persuasion is only one. They are based on deep connections between things rather than some simple surface similarities such as physical resemblance. The choice of things to compare is not necessarily optimal, but is often suggested by arbitrary features of the context in which the analogy is constructed. The things compared in analogies may carry emotional values that make the analogy stronger or weaker. And analogies may involve the comparison of something with more than one analog. All of these factors weigh in the acceptance or rejection of an analogy with respect to its purpose. In the case of the Prince's analogy, there are some obvious problems. For example, the Prince's argument rests on the notion that handguns and cricket bats are equally good implements for killing people. As Alison Crozier, whose daughter was killed in the Dunblane shootings, points out:

Golf clubs are made for sport, for enjoyment. Guns are made to kill. There is no comparison between the two things.

An analogy premised on the ease with which someone might use a golf club or cricket bat in place of a handgun to kill people must be counted as a weak analogy. Additional appeals to tennis racquets, croquet mallets and the like would not make much difference.

Others have offered more plausible analogies to deal with the problems posed by firearms. Consider the suggestion made by Davidoff (1998) that physicians should counsel their patients regarding the potential health consequences of firearm possession. The American College of Physicians surveyed their members on the issue of treating firearms violence as an epidemic like, e.g., AIDS or tobacco addiction (Cassel et al. 1998), and issued a position paper on the subject (Ginsburg 1998). Davidoff (1998: 235) urges medical practitioners to play a similar role in reducing firearms-related injuries as they have done in reducing injuries from other human activities with medical consequences:

But if the only change that comes from reframing gun violence as a medical issue is that internists and surgeons begin actively counseling their patients regularly on gun safety, the effect on firearm violence could be substantial. Our patients looked at us strangely in the 1970s when we began asking them

whether they used seat belts. "What's that got to do with my medical condition?" But clinicians kept at it, and seat-belt counseling, along with improved seat-belt technology and mandatory seat-belt laws, is now seen as part of good preventive practice. The story is much the same with smoking, sexually transmitted diseases, and other difficult behavior-related health issues.

In other words, doctors could begin talking to patients about the risks to which they expose themselves by keeping firearms around them, just as they do in connection with other medically risky practices such as ignoring seat belts, smoking, having unprotected sex, and so on.

Davidoff's analogy or "reframing" (as he calls it) may be judged in the same manner as the analogy offered by Prince Charles. First, it has a specific purpose, namely to advocate that medical practitioners counsel their patients about risks to their health as a result of having firearms. Such counseling has had positive effects in the cases of seat belts, smoking and AIDS, so why not treat firearms possession the same way? More than that, Davidoff's analogy invites us to reconceptualize, or "reframe", the whole issue of firearms possession. As with seat belt usage in the 1970s, the idea of treating firearms as a medical issue appears strange at first. Probably, firearms possession is seen by Americans as an issue of personal security, freedom, and recreational enjoyment. The analogy invites us to consider firearms possession as an issue of increased risk to health and well-being. Second, the argument is not based on simple resemblances of firearms to seat belts, viruses or cigarettes. Clearly, these items are nothing alike. Instead, it is the adverse effect of these things on health that makes them comparable. This analogy does not hold in virtue of superficial features, but in virtue of similarities of cause and effect. Third, of course, Davidoff has selected only medical analogs for comparison. As a physician and editor of the *Annals of Internal Medicine*, these analogs are familiar to him and relevant to the concerns of his readers. Fourth, the seat belt, smoking, and AIDS analogs are emotionally coherent with the issue of firearms use. All are taken quite seriously from a medical standpoint, and the air of gravity associated with counseling for various, medically risky behaviors transfers appropriately to the subject of firearms use and its consequences. And finally, Davidoff cites not one, but three analogs to make his point. This sort of multiple comparison makes his plea for medical counseling all the more inescapable and compelling.

Multiple comparisons of this sort, although they are not typical of analogical reasoning in general, are not unusual either. In spite of this fact, attention to what I will call *multiple analogies* – that is, analogies in which *more than one*

source analog is used to reason about a target analog – has been lacking. David-off's comparison is a multiple analogy because it compares firearms possession to multiple things, namely wearing seat belts, smoking, and having unprotected sex. In contrast, most analogies are *single* in the sense that only one source is used for comparison.² So, for example, when Bierce (1958) defines *wit* as "the salt with which the American humorist spoils his intellectual cookery by leaving it out," he is comparing the activity of writing humor with the activity of cooking and with nothing else.

1.2 Analogy as induction

The exclusive attention paid to single analogies by analogy researchers over the years (see Appendix A for a historical account of this research) may be due in part to the relative abundance of single analogies over multiple ones. In recent times, the tendency to overlook multiple analogies has perhaps been reinforced by the view that analogical reasoning is a simplistic form of induction in which a single observation is used as the basis for a conclusion. Consider an example from (Mill 1872:3.20 §3), who was instrumental in establishing the view of analogy as induction: We know that the Earth and Moon share many properties, e.g., both are solid, round, receive light and heat from the sun, rotate about an axis, exert gravity, etc. We know also that the Earth is inhabited. By analogy, we may conclude that the Moon is inhabited also. This inference is a single analogy, based on a comparison of the Moon to the Earth. (Of course, it is also suspect, as Mill points out.)

Suppose for a moment that Mars, like Earth, is known to be inhabited. We could broaden the basis for our previous inference by including Mars with the Earth as items that are solid, round, receive light and heat from the sun, rotate about an axis, exert gravity, and are inhabited. In that case, the conclusion that the Moon, which is round and so on, is also inhabited would seem to be strengthened. Since this inference involves a comparison between the Moon and *two* other items, namely the Earth and Mars, it should be considered a *multiple* analogy. Looking at multiple analogies in this way, it seems that the only difference between single and multiple analogies is the number of items being compared. As a result, on this view, there appears to be nothing accomplished by a multiple analogy that is not accomplished by the appropriate number of single analogies. A multiple analogy, then, is just more of the same.

Let us characterize this view more precisely. Consider the definition of analogy-as-induction given by Copi & Burgess-Jackson (1992:188). On their view, an analogy is an inference of the following form:

Entities *a*, *b*, *c*, and *d* have attributes P and Q
Entities *a*, *b*, and *c* have attribute R
 Therefore, entity *d* probably has attribute R.

In this inference, entity *d* is the *target* analog, that is, the entity about which we want to make an inference or draw a conclusion. That is why *d* appears alone in the bottom line. Entities *a*, *b*, and *c* are the *source* analogs, that is, the entities about which we are already informed and upon which we will base our conclusion. That is why *a*, *b*, and *c* appear alone in the second line. Note that, on this account, the number of source analogs, as well as attributes, may vary arbitrarily from case to case. When more than one source analog is present, the analogy is multiple.

Now let us turn to an example of a multiple analogy given by Copi & Burgess-Jackson (1992:195):

If I advise you not to send your shirts to such and such a laundry because I sent one there once and it came back ruined, you might caution me against jumping to conclusions and urge that they ought perhaps to be given another chance. On the other hand, if I give you the same advice and justify it by recounting four occasions on which unsatisfactory work was done by them, and report further that our mutual friends Jones and Smith have patronized them repeatedly with similar unhappy results, these premisses serve to establish the conclusion with much higher probability than did the first argument, which cited only a single instance.

In this analogy, your shirt is the target analog and my four shirts and the shirts of Smith and Jones are the source analogs. The source analogs have the properties of having been dirty, cleaned, and finally ruined. The target analog has the property of being dirty and, at least hypothetically, being cleaned, so we conclude that your shirt will probably also be ruined.

The reason for introducing multiple source analogs, on this account, is to increase our assurance that the laundry *always* ruins the shirts that it cleans. If so, it would certainly ruin yours. In other words, the analogy is intended to establish, with high probability, the universal generalization

$$(x)(\text{shirt}(x) \ \& \ \text{clean}(\text{Laundry},x) \rightarrow \text{ruin}(\text{Laundry},x))$$

or “For every *x*, if *x* is a shirt and the Laundry cleans *x*, then the Laundry ruins *x*”. By increasing the number of source analogs, we increase the number of

instances for which this generalization is known to hold true. In this way, we make the analogy less like a comparison between specific things and more like an induction from specific things to a general rule. To Copi & Burgess-Jackson, this transformation is the whole point of multiple analogies.

Since single analogies have, until recently, been viewed as instances of inductive inference, multiple analogies have naturally been looked upon as a minor generalization of the same schema. However, recent research has shown that analogies are not instances of induction as was supposed. Analogies are not based on the establishment of universally generalized rules. Instead, analogies are based on comparisons between the causal or higher-order relationships in which the items in an analogy participate.

To help clarify the difference in these views of analogy, consider how universal generalizations and causal relations operate differently in explaining why a bucketful of water expands when it freezes. Imagine that one chemist, call him U. G., explains that your bucketful of water expands when it freezes because every bucketful of water expands when it freezes. Although U. G.'s statement seems to be true and could be supported by freezing the contents of many other buckets, it is not very illuminating. Imagine next that a second chemist, call her C. R., explains that the alignment of hydrogen bonds among water molecules near freezing *causes* them to adopt a lattice structure that is less dense than in liquid water (Errington & Debenedetti 2001). This explanation points to a causal relationship rather than a universal generalization and is clearly much more to the point. Roughly the same thing is true of analogies: Causal relationships are much more relevant to analogical reasoning than universal generalizations are.

I will outline the current view of analogy as a comparison of systemic relations presently. The point to be made here is as follows. The view that multiple analogies are just like single analogies in all but the number of analogs is based largely on the view that all analogies are inductions. Since this view has been found untenable, the nature of multiple analogies becomes an open question. It behooves us, then, to take a new look at multiple analogies and their relationship to single analogies.

1.3 Analogy as shared structure

To begin this project, we need to come to grips with the modern view of analogy. There is, in fact, no single recent theory of analogy. However, most current theories of analogy make essentially the same claims about what an analogy