Forecasting change - 2
Paradigms sought

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Predictions and variables
We noted in the last article that in predicting the future, social scientists and others primarily use two classes of models: trend models and causal models. Both trend models or causal models follow an overall pattern: in both cases one variable is being predicted by one or more other variables. For instance, when we use trend models we may try to predict future sales volume (one variable) on the basis of sales history (another variable). Similarly, when we use causal models, we may predict human longevity in the year 2000 (one variable) on the basis of nutritional habits and accessibility to health care (other variables).

The power of constants
While both classes of models tend to relate one variable to one or more other variables, what accomplishes the prediction is not variables but *constants.* For instance, if our income grows 5% a year and if we would like to predict our income 10 years from now, both our income and the number of years become variables. It is the constant-5% growth per year-that determines the relationship between years and income and enable us to predict. Similarly, in causal models, we may determine that for every 1,000 cigarettes smoked, the life span is reduced by a month or that every 100 hours of exercise adds a day to one's life. Here again, the relationship between increase (decrease) in life span and cigarettes smoked and exercise is derived through constants (e.g. Life extension in days = .01 exercise time or Life extension in days = -.001 cigarettes smoked).

Practically any prediction model can hold for a limited amount of time. Consequently, shorter term predictions are easier to make than longer term predictions. It is easier to predict what your income is likely to be in the next few months, what our GNP will be next year or how many computers you will have in your home in the next 12 months. It is not so easy to predict the value of these variables if predictions are to extend to the next 10 years.

When prediction models fail, it simply means that the constants of the model are not applicable any more. The fact that the constants enabled you to predict precisely at one point in time does not guarantee that they will continue to do so in the future. This is illustrated in the charts on the following page.

Predictions depend on constants rather than on variables. A reliable prediction will be based on relatively enduring constants.

Where do the constants come from?
Constants are the result of law-like relationships found in the world around us.

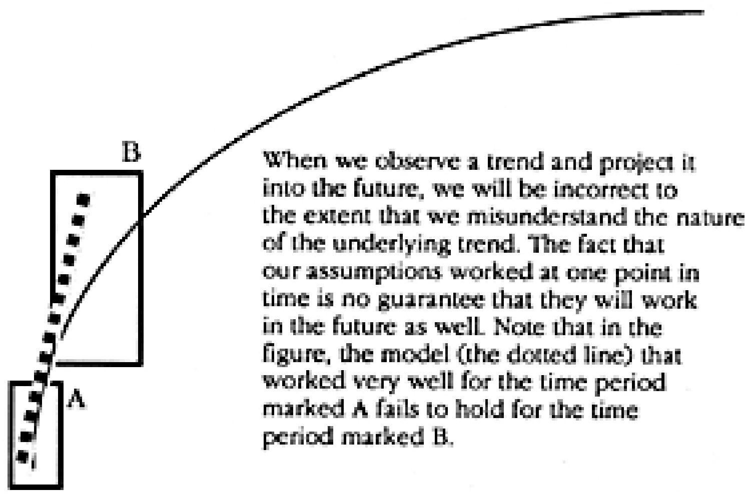
We are all aware that constants exist in the realm of 'hard sciences'. For instance, we all know that our body temperature is a constant at 98.6° F. We all know Boyle's law: PV=C (Pressure times Volume is a Constant). Are we claiming too much if we aver that such constants can be found in social sciences? To answer this question, we need to realize that most 'scientific laws' are not really 'laws' but 'law-like relationships'.

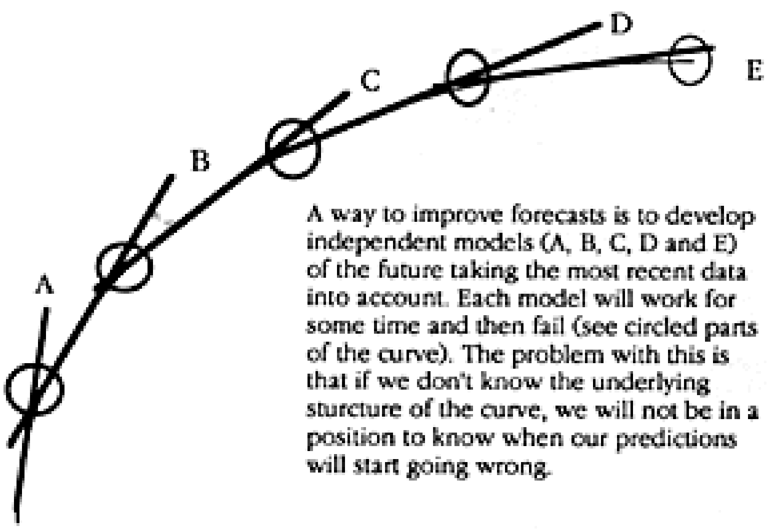
Properties of law-like relationships
Law-like relationships have the following properties (Ehrenberg, 1982)

1. Law-like relationships have limited generality. They are not universal. For instance, body temperature does vary from person to person, extremes of climates, when the body is not functioning properly and so on. Boyle's law does not hold precisely under a wide variety of conditions. In fact, Boyle's law is supposed to hold for 'perfect gases' and perfect gases are defined as those for which Boyle's law holds. No such gas exists! The fact that many physical constants are only approximate and do not hold under all conditions does not negate the fact that these law-like relationships are immensely useful at a practical level.

2. Law-like relationships are approximate. It is generally assumed that laws of science are precise and immutable while laws of social sciences carry no such precision. In reality, 'scientific laws' are not precise, but only approximate. For instance, Boyle's law is an oversimplification. Boyle's law overstates P under certain conditions (like high pressure) and even this relationship is not constant across gases. A more precise statement of Boyle's law would be PV = C (approximate).

3. Law-like relationships do not have to be based on theory or be causal. In general, scientific theories are developed after law-like relationships are discovered. We may have some hypotheses before we start collecting data, but it is the empirical establishment of law-like relationships that leads to a search for explanations. Human beings have been using law-like relationships before scientists began explaining the basis for those law-like relationships. It is not necessary to demonstrate any causal connection while proposing a law-like relationship. Law-like relationships simply identify the structure of relationships, based on empirical data and may or may not imply causality. (If PV=C, it does not follow that either Pressure or Volume causes the Constant.)





Law-like relationships in society

Many law-like relationships can be observed in social phenomena as well. Such law-like relationships are comparable to those observable in 'hard sciences'. For instance, anyone who bought Colgate toothpaste last month is free not to buy it this month; conversely anyone who did not buy it last month is free to buy it this month. Yet if we look at monthly market share of an established product during a stable period, the market share tends to be the same from month to month despite the fact that hundreds of millions of consumers are absolutely free to choose whether to buy the product.

We are already aware of some constants that are related to our physiology: our body temperature stays at 98.6°; the blood pressure and heart beats of healthy individuals hold some constant relationship to factors such as age.

All these constants are in fact variables-for instance, body temperature can go up or down from 98.6°. We already noted how even the laws of Physics-such as Boyle's law-are only a law-like relationship. However, the numbers quoted are stable enough to be called constants.

One cannot claim with any degree of certainty that we can identify constants in society. However, many constants do exist in society. Such constants may not hold for eternity but they do hold for a relatively long period of time. Here are a few examples.

Fatal road accidents

Let us consider traffic fatalities in the United States. We can assume that traffic fatalities are related to drinking-and-driving laws, driver education, car safety features and the like. Since these conditions change over time, it would seem that it is impossible to predict fatal accidents except for the immediate future. Surprising as it may seem, fatal accidents in the United States has been a constant for over 50 years now. The number of traffic fatalities has remained 24±2 per 100,000. This is highly surprising given the changes that have taken place over the past 50 years: seat belt laws, growth in number of cars, laws governing drinking and driving and so on. One can surmise that fatalities touch several lives and when they exceed a certain number (e.g. 24 per 100,000 population), the situation becomes intolerable and stricter laws are passed to keep fatalities below this level. The explanation is only a theory. The fact is that a constant exists that will enable us to predict the number of traffic fatalities for a relatively long time.

Homicide rates

Each city and each country has a constant rate of homicide. These constants hold for a relatively long time. For example, the homicide rate in Toronto is about 50 per year. Constant proportions are obtained in many other cities as well.

It is interesting to see how invariant the numbers are. We can safely assume that there is no overall conspiracy to carry out a specified number of homicides each year. Many homicides may not even be planned. Yet the overall rate is a constant!

We can continue with more examples. The main point is that constants do exist in society just as they do in physical and natural sciences. Societal constants may be more hidden and they may be less enduring than those found in other sciences. All the same, constants do exist in society. By identifying these constants, we can considerably increase the accuracy of our predictions.

Why do we have constants in society?

While it is not easy to answer this question, one can speculate. As we discussed earlier, certain social phenomena (such as traffic fatalities) affect members of the society in specific ways. Those who are thus affected act to control the events in question. Whatever is the cause, the important thing to realize is that there are law-like relationships in society, These are identifiable.

More on prerequisites for a forecast

While a law-like relationship does not have to be universal or precise to be useful, the more universal and precise a law-like relationship is, the more useful it will be. So identification of law-like relationships is a quest for enduring relationships that have wide applicability. As we observed, such law-like relationships do exist in society. Predicting the future is dependent upon our identifying such enduring law-like relationship, This will be explored in future articles.

Fascinating constants

We tend to associate law-like relationships with physical and biological sciences but not with social sciences. But there are constant law-like relationships in society as well. Here are a few relationships that have been consistent over a number of years:

Established constants

- The average speed of a car has stayed constant at 30 mph since the days of the Model-T. (Zahavi et al. 1981)
- The number of people killed in road accidents has been hovering around 24 per 100,000 population for over 50 years. (Marchetti 1983).
- The percentage of income spent on travel: around 12.5%. (Zahavi et al. 1981)

Emerging Constants

- The percentage of Afro-Americans accepted without strife in white neighbourhoods in the U.S.: 8%. (The Economist, 1993)
- The amount a person would spend on software for every dollar spent on hardware = 33 cents. (Modis 1992)

Sources

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