Axioms of Fact Polarization and Fact Ranking - Their Role in Stare Decisis

Reed C. Lawlor
AXIOMS OF FACT POLARIZATION AND FACT RANKING — THEIR ROLE IN STARE DECISIS*

REED C. LAWLOR†

"Somewhere beneath the welter there may be a rationalizing principle revealing system and harmony in what passes for discord and disorder."
— Benjamin Nathan Cardozo

ABSTRACT

UNDER PRESENT NOTIONS of stare decisis, precedents have been considered to be of little value because fact patterns hardly ever repeat themselves. By taking into account fact polarization and fact ranking, precedents can often be used to predict the outcome of a new case even though the new case involves a new fact pattern. Experimental results show that fact polarization and fact ranking lead to consistency between cases. Other experiments show that reversal of polarization leads to inconsistencies. These experiments support the thesis that fact polarization and fact ranking are useful tools for analysis and prediction of judicial decisions. Distinguishing cases on the basis of fact differences may lead to invalid results if account is not taken of fact polarization and fact ranking.

I. INTRODUCTION

For many years, decades, and even centuries, the literature of the law has alluded to a science of law. The word "science" is ambiguous. To some it means knowledge. To others it means system or organization. And to still others, it means something that can be expressed in terms of axioms, postulates, and mathematical rules. Very little effort has been made in the direction of developing a scientific method of law in this third sense.

Some authors have recognized that the judicial decision is a function of the facts.‡ There are those who say that, even though this be

* © Copyright 1969, Reed C. Lawlor. The developments described here were largely conceived during the course of research at the University of Southern California Law Center under National Science Foundation Grant GS-1366. Computations were made on the MH 800 at the USC Computer Laboratory. The views expressed are those of the author and should not be attributed to the National Science Foundation or others.

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true, it is of little help since the same fact situation hardly ever occurs a second time. Consequently, they say, precedents are of little value in predicting the outcome of new cases. Such conclusions have become sacred myths to the law.

Even Sir Frederick Pollock, who hoped there could be a science of law said:

The ultimate object of natural science is to predict events — to say with approximate accuracy what will happen under given conditions. Every special department of science occupies itself with predicting events of a particular kind. Note also that each science occupies itself only with those conditions which are material for its own purposes. The object of legal science, as we here understand it, is likewise to predict events. The particular kind of events it seeks to predict are the decisions of courts of justice. . . .

In natural science we need an all-embracing fundamental assumption before we can take any steps towards prediction; in other words, before we can have any science at all. This assumption is that nature is uniform. We act on the belief that whenever the same conditions are repeated they will give the same result, and we refuse to entertain any supposition to the contrary. . . .

Turning now to legal science, we find that an assumption of the same kind is no less needed. In order to predict physical results, we must suppose that the same thing always happens under the same conditions; and in the same way, in order to predict legal results, we must suppose that the same decision is always given on the same facts. . . . The object is to ensure the same decision being given on the same facts. In English case-law this object is attained by what seems the most obvious and direct means, namely, an understanding that the court shall follow the authority of decisions formerly given on similar facts.²

Pollock, like others, failed to describe how precedents could be used systematically to predict decisions when facts in new cases are not the same as or similar to facts in old cases. The requirement that facts be the same or similar is too restrictive. On the other hand, there may be those who will argue that the methods described in this paper merely represent a form of similarity. In anticipation of such criticism, it is recommended that critics reflect now on what they mean by “same or similar facts.”

It is true that circumstances alter cases. But when should differences in circumstances be permitted to lead to an opposite decision? And when should such differences still require the same decisions? These are basic questions to which we will attempt to provide partial answers.

² Pollock, note 1 supra, at 170.
Given the same facts, a judicial decision depends on the law. If the law changes, the decision may change. The decision also depends on the judge, since different judges often arrive at different decisions, even when they agree on the facts and are acting under the same law. Broadly, the decision function may be written:

\[ d = f (F, L, J) \]

where

\[ d = \text{the decision, PRO or CON.} \]
\[ F = \text{the fact pattern of the case under consideration.} \]
\[ L = \text{the law applicable thereto.} \]
\[ J = \text{the judge making the decision.} \]

It is time to dispel the myth that precedent is of little value, because the same fact pattern seldom appears twice. To do this, it will be shown that there are some simple rules which can often be used to predict the outcome of a new case from an old case, even though the fact pattern of the new case is different from the fact pattern of the old case; that is, at least, where the same law and either the same court or the same judge are involved. The author has proposed a theory of personal stare decisis leading to a unified model that takes into account many different facts\(^3\) on a judge by judge basis. The theory utilizes an axiom of fact polarization\(^4\) and an axiom of fact ranking.

This paper describes these axioms, simple uses for these axioms, and also how they can be used for testing judicial consistency and for predicting the outcome of new cases.

II. AXIOMS OF FACT POLARIZATION
AND FACT RANKING

The following discussion will make special reference to two axioms: the axiom of polarization and the axiom of ranking. These axioms are useful even apart from any advanced mathematical theory of the judicial decision making process and can become powerful tools for analyzing and predicting decisions.

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4. Some analysts object to the term polarization. Some seem to have a distaste for the word because it has come to have a stormy political connotation. This is unfortunate. The term polarization was common in applied mathematics long before it became common in political science. Others object to the use of the term polarization as unnecessary and suggest the use of the word "dichotomy." But dichotomy is not enough. The question is not whether presence and absence of facts have different effects but whether the presence or absence of facts favors a "yes" answer to the particular issues under consideration.
Axiom of Polarization

According to the axiom of fact polarization, the fact patterns of cases can be defined in terms of fact descriptors and these fact descriptors can be so worded that the presence of a corresponding fact favors a particular decision and the absence of that fact favors the opposite decision.

Axiom of Ranking

According to the axiom of fact ranking, fact descriptors can be ranked relative to each other in accordance with their relative strengths with reference to a particular issue. A fact of higher rank has greater strength or weight than a fact of lower rank. Fact ranks can often help in the ranking of cases.

As will be seen below, fact polarization is a form of fact ranking. Hence, the axiom of fact polarization is really a corollary of the axiom of fact ranking. But since fact polarization is generally easier than fact ranking, the two axioms deserve separate recognition. Cases and judges may also often be ranked apart from fact ranking.

Reference Point for Polarization and Ranking

In order to appreciate what is meant by fact polarization more clearly, it is important, first of all, to establish a point of reference. Every lawyer experiences a visceral recognition of the concept of fact polarization. He does this each time he prepares for trial. He does it again each time he prepares a brief. Whenever a lawyer considers presenting a fact to a court, whether it be in terms of evidence or whether it be in a brief, he gives consideration to whether the presence of the fact is favorable to his client or is unfavorable to his client. The focus in his case is the outcome for his client. Lawyers on opposite sides of the same case look upon facts differently. If a fact is considered favorable by one party, more likely than not, it is considered unfavorable by the other party. There will be those gray zones where such simple categorical analysis will not apply. But this is immaterial to the main thrust of the proposition being considered. There are also qualifications which must be taken into account, but they, too, have nothing to do with the main thrust of the proposition at hand.

In order to be able to consider fact polarization objectively, the egocentric standard of the individual lawyer and his client must be avoided. It is necessary to establish a standard to which all may make reference and with respect to which the polarization of a fact descriptor is fixed. The issue of the case is used as the reference point. The
issue is defined as a question which a court is called upon to answer yes or no. If the answer is yes, the decision is PRO. If the answer is no, the decision is CON. A fact descriptor that favors a PRO decision if the fact is present, is said to be positively polarized. One that favors a CON decision if the fact is present, is said to be negatively polarized. To provide a basis for analysis by scientific methods, the issue should be broad enough to apply to many cases that are concerned with the same kind of question. But the issue is not simply a broad topic; it is a central question that arises repeatedly in cases. The issue is usually the broad question upon which the outcome of the entire case depends. The wording of the question determines the direction or sense of polarization of applicable fact descriptors.

The focus of our attention is on issues that arise before particular courts, particularly a court of last resort, such as the United States Supreme Court. It is important to focus attention on a particular court, or on courts at a particular level, because the polarization of a descriptor as viewed by a court at one level is not necessarily the same as the polarization of that descriptor when viewed by a court at another level.

The axiom of polarization assumes the existence of polarizable facts. It assumes that the polarization of each fact descriptor is unique. In other words, the axiom proceeds on the assumption that each fact descriptor is monopolar, that is, that its presence favors just one side of the case regardless of the judge, the presence of other facts, geography, time, and other variables. When it comes to identifying those facts and to defining their polarization, difficulties may be encountered. Though some facts are monopolar and some facts are dipolar, the difference is of little concern herein since most operative facts are monopolar. Dipolar facts are therefore not considered in this article.

As previously mentioned, if a fact descriptor is positively polarized, then the presence of the fact in a case favors a PRO decision; if the fact descriptor is negatively polarized, the absence of the fact favors a PRO decision. Conversely, if the fact descriptor is positively polarized, the absence of the fact favors a CON decision. Similarly, if the fact descriptor is negatively polarized, the presence of the fact favors a CON decision.

Examples of issues are:
1. Issue in right-to-counsel cases.
   Was the accused deprived of due process by virtue of his lack of counsel at some stage in the proceeding?
2. Issue in search and seizure cases.
   Were the circumstances under which the police made a search and seizure of such a character that the constitutional rights
of the accused were violated, entitling him to have the verdict against him set aside?

3. Issue in involuntary confession cases.

Were the circumstances under which the accused made a confession to the crime such that his constitutional rights were violated by the introduction of the confession into evidence?

4. Issue in trademark cases.

Are the trademarks of two users of such a character that confusion is likely to occur as to the origin of the goods to which the respective trademarks are applied.

5. Issue in fair trial v. free press cases.

Were the activities by the press and other media in connection with the trial, of such a character that the accused did not have a fair trial?

6. Issue in deportation cases.

Was the alien guilty of moral turpitude of a kind which would justify his deportation under the Immigration Act?

7. Issue in rule against perpetuities case.

Should the gift in question be treated as valid under the rule against perpetuities?

These and other issues have been studied in the course of research attempting to apply the author's theory of stare decisis. In this kind of research, in order to form a data base from patterns of facts common to the various cases which may be then subjected to various kinds of mathematical analysis, it is first necessary to prepare lists of fact descriptors and to polarize these descriptors.

If the fact descriptors are all polarized in the same direction, then the presence of various facts is cumulative in favor of a PRO decision. In such a case it is often easy to recognize whether one case is stronger or weaker than another. But if the fact descriptors are not uniformly polarized, the fact patterns are confusing and very difficult to compare. Heretofore, little attempt has been made to polarize the description of facts in opinions or in opinion analysis.

Fred Kort appears to be the first person to recognize that it is desirable to polarize all facts in the same manner, in order to simplify the application of certain mathematical methods to the analysis of fact pat-
terns. In effect, Kort assumed that a weight could be attributed to each fact and each fact could be described in such a way that the weight of every fact, if present, added to the total weight of the case. This axiom of weighting, together with the axiom of fact polarization, has led to the first success in applying mathematical methods to the "prediction" of the outcome of individual cases. It is important to recognize that if a mistake is made in the polarization of the fact, then it is necessary to add something to the weight of the case if the fact is absent; or, alternatively, it would be necessary to subtract something from the weight of the case to account for the presence of the fact. Failure to polarize fact descriptors accurately will result in error. Failure to polarize fact descriptors at all makes mathematical analysis impossible or at least unnecessarily difficult.

III. TECHNIQUES FOR POLARIZING FACTS

Once the axiom of polarization is accepted, one is then confronted with the need of actually wording fact descriptors in such a way that they are polarized in a known manner. There are three different ways to determine the polarization of fact descriptors, namely judicial, statistical, and visceral. The term "judicial" polarization refers to the fact that judges often tell us whether the presence of a fact favors a "yes" reply on the issue. The statistical method involves measuring the relative frequency of occurrence of a fact in PRO cases and in CON cases. According to the statistical method, a fact descriptor is considered positively polarized if the corresponding fact appears more frequently in a greater proportion of PRO decisions than CON decisions. Such proportions are called relative frequencies.

If cases occurred randomly and decisions were influenced by the polarization, we would anticipate that positively polarized facts would be present with greater relative frequency in PRO cases than in CON cases, and negatively polarized facts would be present with greater relative frequency in CON cases than in PRO cases. However, both the parties and the lawyers act as filters for determining which cases shall be presented and decided. At the appellate level, in those cases where it is necessary to obtain the consent of the court to hear the case at all, the appellate courts also act as filters. For these reasons, one cannot rely upon the relative frequency of occurrence of facts in PRO cases and CON cases to determine polarization.

If statistical methods alone are utilized for determining polarization, then the polarization of fact descriptors would oscillate with time. Thus, for example, if a fact that occurs with a greater relative fre-
quency in PRO cases is believed to be positively polarized, then fewer appeals would be taken from PRO decisions when such facts are present in lower court decisions. This would result in a reduction of PRO cases on appeal. If we accept the proposition that upper courts tend to uphold the decisions of lower courts, then we are forced to conclude that there would be an increase in the relative frequency of occurrence of those facts in CON cases. This would ultimately result in a higher relative frequency of that fact in CON cases, causing the statistically determined polarization of the fact to be reversed. Then the number of appeals from CON decisions would increase. If it occurs repeatedly, it would cause the statistically determined polarization of a fact descriptor to reverse. This could go on and on, causing the polarization to alternate from positive to negative and back again endlessly. It would be interesting to know whether this does occur in fact. If so, this would suggest that legal institutions have been unconsciously influenced by such statistics.

There is also the visceral methods of polarization. In applying visceral methods to polarize fact descriptors, law students and attorneys are asked for their “gut” reactions to the facts. They are asked whether they feel particular facts, if present, favor a “yes” answer to the issue. Though different techniques have been experimented with, by far the best technique has involved wording a fact descriptor in two contrasting ways, each being the negation of the other, or nearly so, and comparing the two wordings.

One way to polarize fact descriptors effectively when concerned with the analysis of Supreme Court decisions is to ask law students and attorneys which of the two contrasting facts they would rather have present in their case if they were representing the accused in a hearing before the United States Supreme Court. If the issue is worded to favor the accused, this question brings the issue standard and the egocentric standard into coincidence, making it relatively easy to view the facts viscerally. Figure 1 represents a list of contrasting fact descriptors to test the degree of uniformity with which various groups of analysts react viscerally to the fact descriptors.

Figure 1

Experiment in Polarization of Fact Descriptors

<table>
<thead>
<tr>
<th>Analyst:</th>
<th>Date:</th>
</tr>
</thead>
</table>

**Issue:**

Was the accused deprived of due process of law by the introduction of the confession in question into evidence?

In each instance below, indicate by a check mark which of the two parallel facts you feel would have more weight with the Supreme Court in your case if you represented the accused. Stated differently: If you represented the accused, which fact would you rather have on your side of the arguments?
10. Petitioner was warned by a witness to the confession that whatever he said might be used against him. □
17. The request by accused for consultation with friends was granted. □
24. Medical examination of petitioner before and after interrogation showed that adverse physical effects had occurred. □
25. "Relay tactics" were used by police in interrogation. □
40. Many officers were present during the interrogation. □
46. The accused took a requested lie detector test. □
62. The question of admissibility of evidence was argued in the presence of the jury. □
65. The question of voluntariness of the confession was put to the jury. □

Petitioner was told by a witness to the confession that whatever he said would not be used against him. □
The request by accused for consultation with friends was refused. □
Medical examination of petitioner before and after interrogation showed that no adverse physical effect had occurred. □
No "relay tactics" were used by police in interrogation. □
Only one officer was present during the interrogation. □
The accused refused to take a requested lie detector test. □
The question of admissibility of evidence was argued out of the presence of the jury. □
The question of voluntariness of the confession was not put to the jury. □

Experiments with such contrasting fact descriptors have brought forth nearly uniform results from different analysts. Most fact descriptors are monopolar. Some are dipolar. Perhaps some are neutral. Dipolar facts are difficult to handle. But dipolar facts can be replaced by monopolar facts by taking into account the groups of circumstances or the judges which affect the polarization. Dipolar facts are of two kinds. In either event, a dipolar fact, if present, sometimes favors a PRO vote and sometimes favors a CON vote. When the polarity depends upon who the judge is, the dipolar fact is called bijudicial. Very few examples of such a fact have been noted.

In Hudson v. North Carolina the attorney for two codefendants withdrew as the attorney for one defendant and pleaded the other defendant guilty. A number of the Justices of the Supreme Court said that this event would bias the remaining defendant in the eyes of the jury, while others said that this event would elicit the sympathy of the jury for that defendant. All judges treated all jurors alike. Thus, the polarization of the fact descriptor "THE ATTORNEY FOR TWO CODEFENDANTS WITHDREW AS ATTORNEY FOR ONE CODEFENDANT AND PLEADED THE OTHER CODEFENDANT GUILTY" is positive for some judges and negative for others.

It is often argued that the polarity of the fact depends somewhat upon what other facts are present. However, examples are hard to find. Such dipolar facts are amphoteric or chameleon-like. Like a chameleon that changes color depending upon its background, such facts change polarity according to surrounding circumstances.

However, the existence of dipolar facts is immaterial if we can define conditions under which the polarity is in one direction and those in which it is in the opposite direction. Since dipolar facts seldom appear, and in any event, can be converted into monopolar facts, one can assume that if facts are polarizable then they can be described in such terms that the polarity is invariable. Accordingly, in the discussion below, it is assumed that we are concerned with monopolar fact descriptors and that all the fact descriptors are positively polarized.

It is important to note that the polarization of a fact at the appellate level often is exactly the opposite of the polarization of the fact at the trial level. Actually, the recognition by the appellate court of the polarization possessed by the fact at the trial level is often the very factor that creates the opposite polarization of the fact at the appellate level. Thus, for example, the failure of a court below to advise the accused of his right to counsel favors a jury decision against the accused. It is for this very reason that the failure below to give such advice predisposes the appellate court to favor the accused. In this field of law, the appellate court, in effect, attempts to compensate for the bias below by introducing an opposite bias. This bias (in the most complimentary sense of the word) is what creates forces for the achievement of justice under the Constitution.

IV. Mathematical Representation of Polarization

The polarization of a fact descriptor is somewhat like the inherent sign of an algebraic symbol. Let us introduce the following terminology:

\( (f+) \) = This is a fact descriptor which is positively polarized.

\( (f-) \) = This is a fact descriptor which is negatively polarized.

Each of these fact descriptors is the negate of the other.

\( (f+) = (f-) ' \)

In right-to-counsel cases, the decisions of the United States Supreme Court often refer to whether the judge of the lower court advised the accused of his right to counsel. Two oppositely polarized fact descriptors are then possible:

\( c \) = The lower court advised the accused of his right to counsel.

\( d \) = The lower court did not advise the accused of his right to counsel.
According to the axiom of polarization, one of these fact descriptors favors the accused and one of them does not. Clearly these two fact descriptors are inherently polarized at the level of the Supreme Court as follows:

\[(f+) = \text{The court did not advise the accused of his right to counsel.}\]
\[(f-) = \text{The court advised the accused of his right to counsel.}\]

The first symbol means that the corresponding fact descriptor is positively polarized on appeal. If the fact corresponding to the first fact descriptor is present in this case, the presence of that fact favors the accused at the Supreme Court level. The second symbol means that the corresponding fact descriptor is negatively polarized. If the fact corresponding to the second fact descriptor is present in the case, the fact is unfavorable to the accused at the Supreme Court level. We use capital letters to indicate presence values of facts represented by fact descriptors, but incorporate the plus or minus sign as a suffix to indicate whether the fact descriptor is inherently positively polarized or inherently negatively polarized. It follows immediately that

\[(F+) = (F-)’\]
\[(F+)’ = (F-)\]

In other words, the following rule applies:

*The presence value of a fact represented by a positively polarized fact descriptor is the negate of the presence value of the fact when represented in terms of the oppositely polarized fact descriptor.*

The meaning and effect of polarization, and techniques for polarizing fact descriptors have thus been described. It will now be shown how fact patterns can be represented in terms of polarized fact descriptors and how such representations may aid us in the analysis and even prediction of judicial decisions.

V. FACT PATTERNS AND POLARIZATION

Suppose a fact pattern has been constructed for a case in a field of law where six facts are important. Suppose further that when the facts are represented by positively polarized facts, corresponding facts 1, 2, 4 and 5 are present and corresponding facts 3 and 6 are absent.
If all the fact descriptors are positively polarized, the fact pattern of the case may be represented as follows:

Figure 2

**FACT PATTERN WITH POSITIVE POLARIZATION**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

Facts Present: $X$ $X$ $X$ $X$

But if the fact pattern of the same case is represented in terms of negatively polarized facts, the fact pattern would be:

Figure 3

**FACT PATTERN WITH NEGATIVE POLARIZATION**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$X$</td>
</tr>
</tbody>
</table>

Facts Present: $X$ $X$

The second pattern says that when the facts are represented by negatively polarized facts, corresponding facts 1, 2, 4 and 5 are absent and corresponding facts 3 and 6 are present. On the other hand, if fact descriptors 1, 3 and 5 are positively polarized and fact descriptors 2, 4 and 6 are negatively polarized, the fact pattern would be:

Figure 4

**FACT PATTERN WITH MIXED POLARIZATION**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$+$</td>
<td>$-$</td>
</tr>
</tbody>
</table>

Facts Present: $X$ $X$ $X$

In the foregoing examples, the inherent polarization of each fact descriptor has been indicated by the respective plus and minus signs in the row directly beneath the fact number. It is to be noted that the fact pattern of Figure 4 bears little superficial resemblance to those of Figure 2 and Figure 3. Uniform polarization of the fact descriptors introduces a degree of simplicity, whereas mixed polarization often introduces a sense of confusion. For this reason, uniform polarization of fact descriptors can be of help in the analysis of judicial opinions.

On the other hand, it is often necessary to introduce double negatives to achieve uniform inherent polarization. This, too, introduces difficulties. Regardless of the difficulties introduced by double negatives, it has proved to be convenient to utilize sets of fact descriptors having the same polarization. Uniformity of polarization of fact descriptors can aid us in comparing cases.
Ranking of Facts

Some facts clearly have more weight than other facts. In other words, they have a greater tendency toward bringing about a PRO decision. Experiments have shown that it is very difficult to rank all facts, although some are easily ranked. Fact ranking is facilitated by polarizing fact descriptors in the same direction.

In the right-to-counsel field, as in many other fields of law, the following six fact descriptors apply.

1. The party was charged with a crime punishable by a death sentence.
2. The party was charged with a crime subject to a maximum sentence of life imprisonment.
3. The party was charged with a crime subject to a maximum sentence of 20 years imprisonment.
4. The party was charged with a crime subject to a maximum sentence of 10 years imprisonment.
5. The party was charged with a crime subject to a maximum sentence of 5 years imprisonment.
6. The party was charged with a crime subject to a maximum sentence of 1 year imprisonment.

If the facts corresponding to these fact descriptors have a different influence on the court, according to which fact is present, it is easy to rank these descriptors and this ranking should be the same for all judges. An exception might occur, however, for a judge who considers a life sentence more severe than a death sentence. Other fact descriptors can often be ranked even though they deal with somewhat unrelated subjects.

Fact polarization is a form of fact ranking. A positively polarized fact descriptor has a higher rank than a negatively polarized fact descriptor dealing with the same fact or kinds of facts. Reversal of polarization produces a reversal of ranking. Thus, if $R(f)$ means rank of fact $f$, then the following equations are equivalent.

$$R(f_1+) > R(f_2+)$$

$$R(f_3-) > R(f_1-)$$

VI. Comparison of Cases

Lawyers often distinguish cases on the basis of differences of fact patterns. It is not sufficient that the fact patterns be different to explain or justify a difference in votes of two cases.
Consider the following two cases:

Figure 5
RANKABLE PAIR OF CASES WITH POSITIVE POLARIZATION

<table>
<thead>
<tr>
<th>Fact</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polarization</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Case 2 _______ X X X X
Case 1 _______ X X X

For simplicity, let us assume that if a fact descriptor is positively polarized, the fact adds to the weight of the case if the fact is present, but subtracts from the weight of the case if the fact is absent. All the facts present in case 1 of Figure 5, above, are also present in case 2; but in addition, fact 2 is present in case 2, though absent from case 1. Clearly then, by definition, the weight of case 2 is greater than the weight of case 1. The set of facts present in case 1 is a sub-set of the set of facts present in case 2. Two cases of this sort are called a rankable pair of cases.

Since, mathematically speaking, in a certain sense, either case may be PRO or CON and the other case may be also PRO or CON, four different permutations of voting patterns can be associated with these two cases. Three of these voting patterns are consistent. One is inconsistent. Suppose that we have two cases such as case 1 and case 2 just described in which the set of facts present in case 2 is a sub-set of the facts present in case 1. And suppose further that the fact descriptors are positively polarized. Then:

1. The two cases are consistent if both are PRO.
2. The two cases are consistent if both are CON.
3. The two cases are consistent if case 2 is PRO and case 1 is CON.
4. But the cases are inconsistent if case 2 is CON and case 1 is PRO.

If both cases are PRO or both cases are CON, the cases are said to be interdependent. If case 1 is PRO, case 2 should also be PRO. If case 2 is CON, case 1 should also be CON. Consistency of the type just described is called convex consistency.

Assume that you are representing a client for whom a "yes" answer to the issue favors your client and that the facts correspond

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to those in case 2 above, and there is a precedent under consideration which has a fact pattern corresponding to that of case 1 above. Your opponent would be in error if he pointed out that case 2 is to be distinguished from case 1, because the facts are different. Differences of facts would be an inadequate basis for distinguishing between cases. This very distinction in the instant case, together with the polarization of the fact would reinforce the argument that your case should be decided PRO if case 1 was PRO.

In a similar manner, if the new case is case 1 and the old case is case 2, and the old case is a CON case, then case 1 should also be a CON case. But if case 2 is the old case and it is PRO, it does not control the outcome of case 1. In the latter situation, convex consistency would permit the new case to be decided either way.

If, perchance, cases 1 and 2 are both old cases, and case 2 was decided CON while case 1 was decided PRO, regardless of all else, this shows either that the judge made a mistake or that the polarization of fact 2 is incorrect, and this should be taken into account in the analysis of other cases on the issue.

One case that is predictable from another in a set of cases is said to be dependent on the latter. A case that cannot be predicted from any other case in the set is said to be independent. These terms apply, regardless of the order in which the cases are decided.

Similar comparisons may be made between two cases where the fact patterns are the same, except that in each, a fact is present which is absent from the other, and these two facts have a known rank relation. An example is illustrated in Figure 6 below.

**Figure 6**

CASE RANKING BASED ON FACT RANKING

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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</tr>
<tr>
<td>Case 2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this example, cases 1 and 2 are identical except that fact 2 is present in case 2 and absent from case 1, and fact 3 is present in case 1 and absent from case 2. If fact 2 has a higher rank than fact 3, then case 2 has a higher rank than case 1. In this example the cases would be inconsistent, if case 2 is CON and case 1 is PRO. In all other combinations of PRO and CON voting patterns for the two cases, the two cases would be consistent.

Generally speaking, where two cases are identical except that each fact present in the second case, but absent from the first case, has a
higher rank than a corresponding fact that is present in the first case but is absent from the second case, then the second case is of higher rank than the first case. If the case of lower rank is PRO, the case of higher rank must also be PRO. If the case of higher rank is CON, the case of lower rank must also be CON.

Arguments based upon the distinguishing of cases are invalid if they do not take into account the relative ranking of the facts. When one case has a higher rank than another, both cases must be PRO or both cases must be CON or the case of higher rank must be PRO and the case of lower rank must be CON. Otherwise the cases are inconsistent. If two such cases are inconsistent, they are said to violate the principles of ranking consistency.

VII. Types of Judicial Consistency

Four types of judicial consistency (or lack of inconsistency) are now readily identifiable in terms of fact patterns.

Identic Consistency

Where two cases have identical fact patterns, they should produce the same results. Such cases exhibit identic consistency. According to the classic theory, the results should be the same regardless of the judge, but identic consistency between judges does not always exist. If it did, there would be no dissent in any case unless there was a disagreement about the facts. If two cases having identical fact patterns are decided oppositely, the decisions are inconsistent. Such inconsistency between judges is particularly manifest in the opinions of those courts where judges dissent and explain the basis for their dissent. Fortunately the same judge rarely exhibits such inconsistency.

The term identic inconsistency applies where different results are reached on the same set of facts. The term applies particularly where the same judge reached opposite conclusions in two different cases with identical fact patterns insofar as the reported facts are concerned.

Knowledge of fact polarization and fact ranking is not needed to determine identic consistency and inconsistency. Excessive identical cases are redundant in any set of cases.

Convex Consistency

Where all the facts applicable to a specific legal issue are polarizable in the same direction, then if all the decisions are consistent with each other, the PRO decisions can be separated from the CON decisions
by means of a convex hyper-surface. The term convex consistency is applied only to pairs of cases in which the facts present in one case are a sub-set of the facts present in the other case.

**Ranking Consistency**

Where two cases can be ranked one above the other, and if the case of higher rank is CON and the case of lower rank is PRO, the two cases are inconsistent. One case is of higher rank than the other:

1. If the two cases meet the sub-set requirement of convex consistency; or
2. If each fact present only in the case of lower rank is of lower rank than one corresponding fact present only in the case of higher rank.

Inconsistency of any of the foregoing types very rarely occurs, provided one polarizes the fact descriptors properly. The relative frequency of occurrence of inconsistent cases is so rare that the results of consistency tests support the validity of the axiom of polarization.

**Random Consistency**

Two cases are consistent if each includes at least one positively polarized fact not present in the other and the two cases are not rankable on the basis of known rank relations of facts. Where two cases bear a random consistency relationship, either case can be "distinguished on the facts" from the other. And neither case can be used as a controlling precedent to argue what the outcome should be in the other case on the basis of fact polarization or fact ranking. However, this does not foreclose other methods of argument or prediction.

**VIII. SOME EXPERIMENTAL RESULTS RESPECTING FACT POLARIZATION**

The main purpose of our research has been to develop methods for finding the underlying personal equations which relate the decisions of individual judges and the decisions of entire courts as a function of the patterns of facts in the cases before them. This research is still under way. Some results, however, have been reported. In the mean-

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8. See note 7 supra.
time, it turns out that some of the experiments performed have shed some light on the validity of the axiom of polarization, and the axiom of ranking. Two types of experiments help prove these axioms. One type of experiment is called an "expectancy" experiment; the other a "reversal" experiment.

**Expectancy Experiment**

In an expectancy experiment, we observe the number of dependent cases and calculate from this data the number of inconsistent cases to be expected if PRO and CON cases occur randomly among rankable pairs of cases. These numbers are sufficiently large to attach some significance to the fact that few inconsistencies were actually observed. Assume that we have a set of N cases on a particular issue where:

\[ p = \text{fraction of cases that are PRO}. \]
\[ q = \text{fraction of cases that are CON}. \]

Further, in any set of cases:

- \( R \) = number of rankable pairs of cases.
- \( A \) = number of pairs of rankable PRO cases.
- \( D \) = number of pairs of rankable CON cases.
- \( B \) = number of inconsistent pairs of rankable cases.
- \( C \) = number of consistent pairs of rankable cases where one case is PRO and the other case is CON.

If all the data are available, it can be arranged in a two-by-two contingency table:

<table>
<thead>
<tr>
<th></th>
<th>PRO</th>
<th>CON</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRO</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>CON</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

If \( A, B, C \text{ and } D \) are all known, then \( R = A + B + C + D \).

In certain experiments (which were performed for other purposes) the value of \( C \) was not measured and hence the value of \( R \) was unknown. Only the variables \( A, C \text{ and } D \) were measured. Nevertheless, the number \( B \) of inconsistent pairs to be expected can be calculated if polarization and ranking have no influence on the outcome.
More particularly, if we assume that PRO and CON cases occur randomly among rankable pairs, then the number of inconsistent pairs (B) of rankable cases to be expected can be calculated from the numbers of consistent dependent pairs A and D.

In spite of the fact that the value of R is not known, a relation can be calculated that should exist between the proportions of cases which fall in the categories A, D and B. Thus, if PRO and CON cases occur randomly in rankable pairs of cases:

\[ A = p^2R \]
\[ D = q^2R \]
\[ B = pqR \]

From these equations it follows that: \[ B = \sqrt{A \times D} \]

This formula says that if we multiply the number of rankable pairs of PRO cases by the number of rankable pairs of CON cases, the square root of the product should equal the number of pairs of inconsistent cases to be expected in the absence of influence of fact polarization and fact ranking.

Since both A and D are measured in certain cases, one can calculate the expected value of B and compare the expected value of B with the observed value of B. In other words, one compares the expected number of inconsistent pairs of rankable cases with the number of pairs of inconsistent rankable cases actually observed. Such comparisons appear in Table 1 below:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>D</th>
<th>Expected</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clayton (U.S.)</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Fair Trial Free Press (U.S.)</td>
<td>3</td>
<td>14</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Deportation (CA2 and CA9)</td>
<td>86</td>
<td>1</td>
<td>9</td>
<td>0</td>
</tr>
</tbody>
</table>

The Fair Trial Free Press cases used to compile Table 2 were decided in the United States Supreme Court. In the data for these cases the counts A and D apply only to dependent cases that were interrelated by ranking of facts. Cases which could be ranked because

10. These results disregard an identic inconsistency which was found by an analyst between two decisions of the Ninth Circuit. The two cases are Burr v. Edgar, 292 F.2d 593 (9th Cir. 1961) and Wood v. Hoy, 266 F.2d 825 (9th Cir. 1959). Careful analysis of the facts reveals that the facts in Wood would require a decision opposite from that rendered.
they satisfied the convex consistency test were not counted since, in this particular study, convex consistency tests were originally employed in order to detect errors in analysis. It is interesting to note that similar results are obtained when this type of analysis is applied to the individual Justices in the Fair Trial v. Free Press cases. The data obtained from such an analysis are set forth below in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Justice</th>
<th>A</th>
<th>D</th>
<th>Expected</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Douglas</td>
<td>7</td>
<td>3</td>
<td>4.5</td>
<td>0</td>
</tr>
<tr>
<td>Clark</td>
<td>3</td>
<td>12</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Warren</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Harlan</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Brennan</td>
<td>3</td>
<td>7</td>
<td>4.5</td>
<td>0</td>
</tr>
<tr>
<td>Stewart</td>
<td>3</td>
<td>7</td>
<td>4.5</td>
<td>0</td>
</tr>
</tbody>
</table>

The only inconsistency observed for all the individual judges was the inconsistency found for Justice Black. In this case, the flaw was in the analysis. The analyst had omitted from the fact descriptor list a fact which Black had considered important.

Statisticians will frown on the foregoing results because the numbers involved are small. The impact of the conclusion, however, is to be found in the consistency of the results from one field of law to another and from one judge to another. Where attempts were made to polarize the facts uniformly, and in a positive direction, inconsistencies hardly ever occurred, even though a substantial number of inconsistencies were to be expected because of the frequent occurrence of rankable pairs of PRO decisions, and rankable pairs of CON decisions. The conclusion is inescapable. The axioms of polarization and ranking lead to an unexpected degree of consistency.

Reversal Experiments

In a second type of experiment, a study was made to determine the effect of reversal of polarization. This particular study was applied to the analysis of a number of cases concerned with the Rule Against Perpetuities. The original data was prepared by a group of analysts at Ohio State University.¹¹

No information was supplied by the original analysts regarding polarization. Their fact descriptors appear to have been selected with-

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¹¹. These cases were analyzed by Robert J. Lynn, Professor of Law at Ohio State University and a student, James Carpenter, now Associate Professor of Law at Ohio State University.
out regard to polarization. The descriptors were reworded slightly to convert them to sentence form but without altering their polarization. A number of persons working at the University of Southern California attempted to polarize the (slightly reworded) fact descriptors. The conference method was employed. The polarization of the facts was discussed along with different methods of polarization and each analyst recorded his own view. These fact descriptors were difficult to polarize, and uniformity of polarization was not achieved. The lack of uniformity is exhibited by Table 3. In this Table a “+” represents positive polarization, whereas a “−” represents negative polarization, as determined by the analysts identified by the letters B, L, Z, S, and O. The heading F represents polarization determined by the statistical method.

<table>
<thead>
<tr>
<th>Fact No.</th>
<th>F</th>
<th>B</th>
<th>L</th>
<th>Z</th>
<th>S</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>2</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>3</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>6</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>7</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>8</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>9</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>10</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>11</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>12</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>13</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>14</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>15</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

It is clear from Table 3 that there is often high agreement as to how a fact descriptor is polarized. However, there is also disagreement. This data represents a real challenge because: (1) the analysts who polarized the fact descriptors had nothing to do with the choice of the fact descriptors or the analysis of the cases and (2) polarization by different analysts was far from uniform. In this particular field of law, many different gifts (bequests, et al.) are considered in the same case and PRO decisions are rendered with respect to some gifts and CON decisions are rendered with respect to others in the same case.

12. Table 3 is only a partial reproduction representing about one-third of the facts polarized.
Each gift was treated as a separate case for the purpose of analysis, resulting in an increase from the number of "cases" from 27 to 320. The body of cases included both trial court cases and appellate cases from a total of thirteen states. Two of the cases having identical fact patterns were reported to have resulted in opposite decisions. This is an example of an identic inconsistency.

When tests were made to determine the number of inconsistencies occurring with fact patterns based upon the various sets of polarization set forth in Table 3, it was found that only two inconsistencies appeared with the statistical polarization F and only one inconsistency appeared for the polarization chosen by each analyst. On the other hand, the initial random polarization produced four inconsistencies. As used here the term inconsistency refers to the minimum number of cases that must be disregarded to remove identic and other convex inconsistencies.

The results were not greatly different from those obtained with the statistical polarization. The results are shown under the Column (B) in Table 4. In other words, for the purpose of this analysis, the disagreement between the analysts (B, L, Z, S, and O) respecting the polarization of the facts was immaterial. Polarization was difficult, but differences did not matter in this test.

Table 4

<table>
<thead>
<tr>
<th>Polarization</th>
<th>(B)</th>
<th>(C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Z</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>S</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>O</td>
<td>1</td>
<td>16</td>
</tr>
</tbody>
</table>

Actually, in the case of the six analysts, four pairs of inconsistencies appeared but there was one case common to all four pairs. This one case was also involved in an identic inconsistency. In this particular instance, therefore, instead of counting 4 for the total number of inconsistent pairs, we have recorded a "1" to indicate that by removing one particular case from the data base, all identic and convex inconsistencies would disappear. In the case of the statistical polarization, the same four cases resulted in six pairs of inconsistencies. Two cases accounted for the six pairs of inconsistencies.

Then the polarization of the fact descriptors was reversed. In such a case, as indicated previously in Figures 2 and 3, each fact absent
was treated as its negate present, and each fact present was treated as its negate absent. The number of convex inconsistencies then observed is given under Column (C) in Table 4.

For the original, random, polarization (R), reversal of polarization resulted in improvement. The contrast in results between the original, random, polarization and the systematic polarizations is statistically significant to the 0.99 level. The fact that so many inconsistencies (C) appeared when the statistical polarization and the polarization by the analysts were reversed, makes out a strong case for the conclusion that polarization of fact descriptors is important even in a field of law where polarization is difficult.

While differences appear for the different sets of systematic polarization, the differences are not sufficiently great to be statistically significant. This test, therefore, did not prove clearly one way or another whether statistical polarization or visceral polarization was more effective. It merely proved that some polarization is good. Tests are under way to determine what differences in results will be obtained with various sets of polarization on the reliability of prediction methods applied to cases involving random consistency.

IX. Qualifications

The foregoing discussion must be qualified by the fact that there is usually considerable uncertainty about the fact pattern for each case. Experiments have shown\(^\text{13}\) that analysts have difficulty agreeing as to what facts were in sight of the court as revealed by the opinion of the court itself. The reliability of determining the presence or absence of any particular fact averages around 85% to 95%, depending upon the ability and experience of the analyst.

The uncertainty then of knowing what facts are present in any case must be taken into account in any reasoning based upon fact content of cases. This is true, however, not only in the methods of reasoning described here which utilize fact polarization and fact ranking, but even where one is applying methods which, like that described by Pollock;\(^\text{14}\) state that the same fact pattern should lead to the same conclusion. Who knows for sure when two fact patterns are the same?

In a more fully developed theory of analysis, the uncertainties in our knowledge about the fact patterns would be taken into account and the ranking relation between cases would be expressed in terms of probability. And the outcome based on polarization logic and ranking logic would also be expressed as a probability.

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14. See Pollock, note 1 supra.
X. Conclusion

The principal conclusion to be drawn from the foregoing experiments is that the axiom of polarization is essential to any method which assumes that the decision of a case depends upon the weight of a case and the weight of the case somehow represents the sum of the weights of the facts. The conclusion can be extended to more complex decision functions.

Polarization of facts may often be easy but sometimes it is difficult. In any event, it is clear that complete disregard of polarization introduces serious errors in analysis. So far, fact ranking has proved difficult. Fact polarization and fact ranking are two important phenomena that should be considered in fact content analysis of judicial opinions. The study of these factors is important to the development of a mathematical theory of the judicial decision-making process. The utility of concepts of polarization and ranking is not limited to mathematical methods of analysis. These concepts are also applicable to non-mathematical methods of analyzing legal problems.

By polarizing and ranking facts, it often becomes possible to predict the outcome of new cases from old cases, even though the fact patterns of the two cases are not the same. Furthermore, by taking into account the polarization of facts, errors in legal reasoning that may otherwise arise in distinguishing cases in the conventional manner can often be detected.

The concept of polarization and ranking of facts may be helpful in understanding how lawyers and judges feel about cases. They may even be helpful in explaining some visceral reactions and hunches in a logical manner. These concepts, it is submitted, merely recognize what is old in the judicial decision-making process and hence represent aspects of a rationalizing principle which can reveal system and harmony in what has heretofore passed for discord and disorder. These concepts merely make explicit what has long been recognized by lawyers and judges alike. But explicit recognition of these concepts makes it necessary to alter the prevailing views about stare decisis and precedents.

The old theory of stare decisis requiring facts to be the same to warrant prediction and the prevailing myth that precedents have little value because identical fact patterns seldom occur, should be replaced by a system of legal reasoning that explicitly takes into account the concepts of fact polarization and fact ranking. On this basis every old case can be a controlling precedent for millions or billions of cases having different fact patterns.