2 The Law as a Paradigm of Case-Based Argument

Case-based argument plays an essential role in legal argument. An attorney's law school training and legal practice inculcate standards of legal argument, and those standards strongly prefer arguments whose conclusions are justified by citing precedents (prior legal cases). In the American legal system, there is also a strong theoretical reason that case-based arguments are preferred. Under the common law doctrine of *stare decisis*, like cases are decided alike. Courts are bound to decide a case in accordance with the most analogous precedent.

2.1 A Scenario

Let us examine the quandary of a fictitious attorney in dire need of an argument.

It was 5:55 P.M. An associate of a major New York law firm sat in the walnut-paneled library at 13 Wall Street. He had opera tickets in his pocket for 8:00 that night, *Pagliacci*, and his socialite fiancée and her parents were to meet him at the Met. At 5:00, just before leaving for the day, Howe, a partner in the firm, buttonholed the associate in the elevator and recounted to him a telephone conversation between Howe and the house counsel of one of the firm's big oil company clients, Amexxco. The house counsel had been very angry. She complained that Amexxco was getting "shafted" by a particular former employee named G. Whiz. Mr. Whiz had developed a computer program, called Dipper, for analyzing drilling logs of oil wells. Last week Whiz quit, started his own consulting company, and was about to enter into a contract with Amexxco's competitor, Exxssinc, for computerized analysis of oil drilling logs. The house counsel wanted to know ASAP whether Amexxco could get an injunction against Whiz and Exxssinc to prevent Whiz from using or disclosing anything about the Dipper program. Howe promised to have an answer by 10:00 A.M. the next day. And that is why the associate sat in the walnut-paneled library as the hands of the brass pendulum clock showed 6:00.

There was more to Howe's story. Apparently Whiz, an expert on drilling log analysis, has a background in some arcane computer science specialty. Howe thought she said "AY." "Just like Howe to get it wrong," thought the associate. The house counsel had told Howe she was particularly worried about the fact that although Whiz was on the

Amexxco payroll, he had developed the Dipper program on his own initiative. For four years, Amexxco had repeatedly directed Whiz to drop the Dipper in favor of another approach. Then, a couple of weeks ago, in an experiment cooked up by Whiz, the Dipper actually discovered a major producing well. Last week Whiz quit over a dispute about salary and the use of the Dipper program. "At least," thought the associate, "Howe had sense enough to ask the house counsel whether Whiz had signed a nondisclosure agreement with Amexxco." Whiz had signed such an agreement when he first began working for Amexxco, long before he started work on the Dipper.

Trade secrets law wasn't exactly the associate's field. On the one hand, the facts that there was a nondisclosure agreement and that Whiz was an Amexxco employee when he developed the Dipper program seemed to him to help Amexxco's position. On the other hand, it sounded as if Whiz had been right about the Dipper program all along and Amexxco had been wrong. If Whiz hadn't been persistent enough to continue working on Dipper over Amexxco's objections, there wouldn't be a Dipper program to scrap over. Whiz ought to have some rights to the program. But what rights? All? None? "If it were up to me," the associate thought, "I'd give the guy a break, but Howe isn't billing me out at $250 per hour to do justice, and now its 6:10 and the taxi ride is going to take at least 45 minutes."

The associate knew that whatever conclusion he might come to, the house counsel was not going to take his word for it, or Howe's for that matter. She would have to be convinced, and it would take a legal argument to convince her. And at 6:15 P.M. a legal argument was precisely what the associate did not have. "Muffy and her parents have probably left Manhasset by now," he thought as he glanced at his watch.

2.2   What a Legal Argument Should Be

The associate needs to make an argument fast. Although he may not be an expert on trade secrets law, he knows what a legal argument looks like and how to tell if it is a good one. He knows what the facts of the dispute are, or at least some of them, and his firm's library contains most of the world's recorded knowledge on the subject of trade secrets misappropriation. The trick is to find the most relevant bits of that

mountain of arcana to justify Amexxco's position.

The associate has been asked to provide a specific kind of information: a legally justifiable argument in favor of Amexxco on which to base a decision by Amexxco to commence a lawsuit against Whiz and Exxssinc to enjoin them from using Dipper. The associate knows who the parties to the lawsuit will be—Amexxco will bring suit as the plaintiff against Exxssinc and Whiz as defendants—and that he represents the plaintiff's side.

The associate's answer will take the form of a legal memorandum setting forth

- a summary of the facts of the dispute as he knows or assumes them to be;

- a description of the claims that Amexxco can bring against Whiz and Exxssinc (a claim is a recognized form of complaint for which the courts will grant relief, such as trade secrets misappropriation, breach of contract, copyright or patent infringement, or negligence);

- for each claim, a summary of the legal points that can be made for or against Amexxco's position on the claim.

Although there are no hard and fast rules for what a point in a legal argument should be, attorneys would expect to see three components:

1. A legal conclusion. Of the many kinds of legal conclusions, we will be concerned primarily with assertions that a side in a particular fact situation should win or lose a claim.

2. A justification. In a legal argument, a justification is a citation to an authority in support of the legal conclusion. There are four main kinds of authorities to cite in a legal argument: legal cases; court-made rules or principles; provisions of statutes, constitutions, and administrative regulations; and so-called secondary authorities, including scholarly legal works such as treatises.

3. A rationale why the justification applies. For each kind of authority there is a fairly standard way of substantiating that the authority cited in the justification applies to the particular facts of the current dispute.

The associate's task, then, is to determine what points can be made in a legal argument in favor of Amexxco. He must decide what kinds of legal claims Amexxco can assert against Whiz and Exxssinc, search his legal library for authorities to cite, and explain why the authority justifies the conclusion that Amexxco should win those claims.

2.2.1 Justifying by Citing Precedents

In the context of planning a lawsuit, the most important points the associate can turn up are those that cite precedents as authorities. The partner and house counsel will feel secure about assessing a lawsuit's prospects only if they can see and compare their client's fact situation with the cases they would cite in making an argument before the court and the cases that Whiz and Exxssinc would cite against them.

When the justification cites a legal case, the argument is an argument by analogy. The advocate asserts the legal conclusion that the current dispute should be decided in the same way as the cited case. His rationale is to draw an analogy between the current dispute and the cited case by pointing out the important similarities between them.

For purposes of drawing an analogy to a prior case or precedent, the similarities that matter involve facts that constitute strengths or weaknesses in the plaintiff's position on that claim. The plaintiff can make a strong point for its position on a particular claim if it can cite a case won by a plaintiff, involving the same kind of claim, and having the same plaintiff's strengths and weaknesses in common with the current dispute.

Even when the cited authority is a statute or a court-made rule or policy, the preferable way to make an argument is still to draw an analogy to precedents in addition to citing the statute. An advocate who seeks to show that a statutory provision or court-made principle applies to a client's facts finds other previously decided cases, selects those in which courts have decided in favor of the same side that the provision or principle applied, and argues by analogy that the court should decide in favor of the client because the client's facts are the same as those presented in the precedent.

The question of what strengths and weaknesses matter for a particular claim is important and controversial. One answer is that a strength or weakness matters if there is case (either the cited case or some other

precedent) where the court has held that the facts associated with the strength or weakness made a difference in the outcome of the case, in favor of either the plaintiff or the defendant on that claim. A holding is the conclusion of the court as to the legal effect on each claim of the facts of the case, in favor of the plaintiff or the defendant. When asserting that a particular strength or weakness in a side's position makes a difference to the outcome, an attorney is always in a better adversarial position if he or she can cite a case where a court held that a similar strength or weakness mattered for that type of claim.

There are other answers to the question of what strengths and weaknesses matter for a claim. The issue is bound up with the controversial question of what determines the importance of similarities and differences in analogical legal reasoning. Despite the existence of a jurisprudential debate, in practice attorneys make arguments by analogy all the time.

2.2.2 What Precedents to Cite in a Point

The associate must find the right precedents to cite on behalf of Amexxco, but what are the right precedents? There are five basic criteria:

1. Same claim. The precedent should involve the same claim as the conclusion for which the attorney is arguing.

2. Same side. The side who won the precedent should be the same side for whom the attorney is arguing.

3. On point. A precedent is on point to the extent that it shares the same strengths and weaknesses as are present in the current dispute.

4. Most on point. The goal is to find the most-on-point precedents— the cases sharing the most strengths and weaknesses in common with the current dispute. These are the cases most analogous to the current dispute. In particular, the goal is to find cases that are more on point than any cases that held for the opponent's side.

5. Highest pedigree. All courts are not equal, and thus neither are all precedents. They have pedigrees. Precedents are better authorities to the extent that they were

- decided by a court of the same state whose law applies, a court of the relevant jurisdiction (figuring out which state's law applies may be a complicated issue that will also require case-based arguments to resolve),
- decided by the highest court of the relevant jurisdiction,
- decided after a full trial on the merits of the claim,
- never overturned, distinguished, or questioned by a subsequent court of the same or higher rank.

The associate's goal is clear: he must find the most-on-point cases with the highest pedigrees that favor Amexxco as the plaintiff, the side he represents. For example, he needs some precedent cases with claims for trade secrets misappropriation or breach of a nondisclosure agreement where an employee who signed a nondisclosure agreement worked on a product and then left to work on his own or for someone else using the information about the product and where the plaintiff won despite the fact that the employee was the sole developer of the product. He can use these cases to make strong points for Amexxco.

If the associate cannot find cases that are exactly on point, that is, that share all of the strengths and weaknesses in common with the current dispute, then he will settle for cases that are as on point as possible. His points, however, will not be as strong to the extent that his cited cases are not on point or there are even more-on-point cases for the opponents to cite in response.

2.2.3 Responding to Precedents

Since the associate can be sure that his opponents will point out the failings of his cited cases, he must consider their possible responses to his points in order to evaluate the strength of his side's argument. In general, responses to a precedent-citing point in a legal argument consist of combinations of the following: distinguishing the cited case, citing a real (or hypothetical) case as a counterexample, attacking the cited case's pedigree, and citing a contrary statutory provision or policy.

Distinguishing a cited case is a primary means of responding to it. An advocate argues that the case is not analogous to the fact situation by pointing out strengths and weaknesses that they do not share and that justify not treating the former as a precedent for the latter. If the

point being responded to was made on behalf of side 1, facts that favor side 1's opponent, side 2, in the current dispute but were not present in the cited case, or that favored side 1 in the cited case but were not present in the current dispute, are distinctions. According to this kind of response, there is no need to follow the cited case as a precedent if the current dispute presents relative strengths for side 2 not considered in the cited case.

Citing another precedent as a counterexample is a second important way of responding to a point. A counterexample is a case that shares some of the same strengths and weaknesses with the case at hand as side 1's cited case but held nevertheless for side 2. By citing a counterexample, side 2 makes a point for its own side (it draws the analogy between the counterexample and the case at hand) and uses the contrasting result to show that the analogy drawn by side 1 is not compelling. Some counterexamples are better than others. A counterexample might be a hypothetical case, a made-up factual dispute that has not been decided by an actual court. In general, however, a counterexample is more persuasive to the extent that it is an actual decided case that is

- more on point than the cited case, that is, to the extent it has more strengths and weaknesses in common with the case at hand than the cited case, or

- an extreme example of some of the same pro-side 1 features as the cited case but still held for side 2.

A response can also attack the cited case's pedigree. Essentially the attorney argues that the court is not bound to follow the cited case because the cited case was

- decided by a court from another jurisdiction,

- not decided by an equivalent or superior court in the judicial hierarchy,

- overturned, distinguished, or questioned by a subsequent higher-ranking court, or

- involved a procedural setting that did not fully present the issues.

Statutory provisions, court-made rules, and policies also can be cited in response to a point. Side 2 may cite a provision or policy that contradicts the point's conclusion. Such a response would be improved by citing a case where the court expressly applied the provision or policy in holding for Side 2.

2.2.4   What about Other Facts?

As the associate builds his points and responses, inevitably he must worry about whether he has all of the facts. The house counsel may not have told Howe all of the facts relevant to the dispute. She may not have conducted a thorough investigation; she even may not know all of the kinds of facts that would be relevant. Even if facts are known, they still must be proved at trial. If the precedents indicate that a particular fact is crucial, the associate must plan for the contingency that his side will fail to prove it. Also he does not know what facts the opposing side may prove.

The associate's memorandum should flag these contingencies. It should pose hypotheticals like the following: What if Amexxco has disclosed information about Dipper to customers or in professional articles or sales literature? What if Amexxco has failed to take adequate measures to protect its trade secret information in Dipper?

2.2.5   Evaluating a Legal Argument

After the associate has assembled all of the on-point cases he can find for both sides, he, Howe, and the house counsel will have to assess how strong an argument each side can make. They must try to decide whether they have adequate grounds to commence a lawsuit and whether they have a winning argument. They will ask questions like the following:

- Do we (representing plaintiff) have cases to cite on a claim?

- Do they (representing defendant) have cases to cite?

- Are our cases distinguishable?

- Are any of their cases more-on-point than any of ours?

- Can either side cite any cases for which there are no more-on-point counterexamples?

- Have any of the cases been overturned?

- Are there significant contingencies for which we do not have information?

- What cases can we cite if the contingencies occur?

It is noteworthy that the attorneys cannot deduce how strong their legal argument is from the language of the statutes or the restatements of the law in the legal treatises. Appendixes A and B show excerpts from some representative statutory provisions and restatements. The definitions are far too general to determine whether the concepts apply to the fact situation. Even if they do apply, no attorney would be satisfied with citing just such a provision in support of his argument but would also seek to cite cases as authorities.

Similarly, the various statements of the elements of a legal claim propounded by courts or scholars are unavailing. The elements of a claim are generalized statements of the facts that must be proved in order to prevail on the claim. There is little agreement about the elements of a trade secrets claim. Compare the statement in [Gilburne and Johnston 1982, p. 215] that there are three elements as a condition of the existence of the trade secret: "novelty, secrecy and value in the trade or business of the putative trade secret owner" with the fact that neither [Milgrim 1985] nor [Nimmer 1985] is willing to list definitively the elements of a trade secrets claim. The primary utility of these statements of a claim's requirements are not as definitions but as annotated guides to cases.

The drafters of the Restatement (appendix B) were remarkably frank about the limitations of their definition of trade secrets:

An exact definition of a trade secret is not possible. Some *factors* to be considered in determining whether given information is one's trade secret are:
(1) the extent to which the information is known outside of his business;
(2) the extent to which it is known by employees and others involved in his business;
(3) the extent of measures taken by him to guard the secrecy of the information;
(4) the value of the information to him and to his competitors;
(5) the amount of effort or money expended by him in developing the information;
(6) the ease or difficulty with which the information could be properly acquired or duplicated by others. Res. (First) of Torts Sec. 757 comment b.

In order to supplement the deficiencies in their definition of trade secrets, the drafters of the Restatement described various factors that attorneys and judges should look for in the cases. "It is most common to discuss trade secrets in terms of the factors... tending to define a trade secret" [Nimmer 1985, pp. 3–4]. In the next chapter, we will see how factors play an important role as a way of indexing and organizing cases in a computerized database.

2.2.6   Finding the Cases

How can the associate come up with the right cases to cite in a legal argument? The firm's legal library offers the associate many routes into cases that he may cite. There are four major ones:

1. Digests. The associate can search manually through one of the many legal digests. The digests have hierarchical indexes to cover major areas of the law such as trade secrets. The attorney needs to examine the many entries to the index looking for promising entries such as "employee" and "nondisclosure agreements," turn to the digests, and manually scan the annotations for cases that appear to have interesting similarities to the current dispute. One especially useful index would include factors like those in the Restatement's commentary. If the associate knows or can find out what trade secret factors apply to his problem and if a digest indexed cases by those factors, he would be able to find useful cases.

2. Annotated statutes and treatises. The associate can examine the case annotations listed in the statutes and legal treatises dealing with trade secrets misappropriation. Reporting services index cases interpreting a particular statutory provision. The attorney must know what statutory provisions might be relevant to his fact situation. In treatises, legal propositions are annotated in footnotes containing cases that are examples of or counterexamples to the proposition. In order to find relevant propositions and cases, the attorney must scan the Contents or use the index of legal concepts to find potentially useful propositions and then scan the footnotes.

3. Full-text retrieval systems. The Lexis and Westlaw systems contain immense databases of the full text of legal cases. See [Sprowl 1976a, Sprowl 1976b]. The attorney fashions queries using logical

strings of keywords like "trade secrets," "employee," "nondisclosure agreement," or "sole developer." The system retrieves all cases evidencing the keywords ranked according to statistical criteria. The attorney must know what keywords to use and be prepared to scan the cases returned by the system.

4. Other computerized legal databases (Shepardizing). If the attorney knows of a relevant legal case, he may easily find all other cases that cite the case approvingly or disapprovingly, some of which are likely also to be relevant. The cross-references among legal cases are extensively documented in physical volumes and computerized databases.

All of these routes of access have disadvantages. Manual searches are time-consuming. Index entries may be too general to focus the attorney quickly on cases that share important analogous features. The indexes tend to have numerous entries, any of which might contain relevant information and all of which have to be examined. The visual scan of the annotations under each entry is thwarted if the descriptions of the cases are too general to disclose the particular features.

The full-text retrieval schemes have all of the problems of keyword searches [Blair and Maron 1985, Hafner 1987]:

- Ambiguity. The same keywords have different meanings in various legal areas, leading to retrieval of irrelevant cases.

- Synonyms. Relevant cases are omitted because they employed synonyms of keywords.

- Query composition. The attorney may not know the best, or even appropriate, keywords to use.

- Screening. The statistical criteria used to rank retrieved cases have little to do with the actual relative utility of the cases for the attorney's purpose. In attempting to pare down the list of retrieved cases to a manageable number, the attorney is forced to add logical qualifications to the query that arbitrarily skew the search, discarding potentially relevant cases.

2.3 Hypo: An Alternative

Alternatively the associate could use the computer program Hypo. With Hypo, the associate describes the facts of the problem. In response to inputting into Hypo the *Amexxco* fact situation, the program outputs (1) a summary of the best cases for the plaintiff or defendant to cite, (2) arguments showing how those cases can be cited and responded to, and (3) suggested hypothetical modifications of the problem that show how either side's argument could be improved. Hypo's Citation Summary of the *Amexxco* fact situation shows the best cases that each side can cite:

> ### Citation Summary for *Amexxco* Case
>
> On a claim for Trade Secrets Misappropriation, both sides can make a strong argument.
>
> Plaintiff can cite the following cases for which there are no more-on-point counterexamples:
>
> Structural Dynamics Research Corp. v. Engineering Mechanics Research Corp., 401 F. Supp. 1102 (E.D. Mich. 1975)
>
> Defendant can cite the following cases for which there are no more-on-point counterexamples:
>
> Amoco Production Co. v. Lindley, 609 P.2d 733 (Okla. 1980).

Hypo's precedent-citing arguments present opposing viewpoints of both sides in the argument: plaintiff and defendant. They are called "3-Ply Arguments" because they step through three plies, or turns, of an argument citing a precedent. In each 3-Ply Argument, Hypo makes a point for one side, drawing the analogy between the problem and the precedent, responds on behalf of the opponent by distinguishing the cited case and citing other precedents as counterexamples to it, and finally rebutting the response by, for example, distinguishing the counterexample.

> ### 3-Ply Argument for *Amexxco* Case
>
> $\implies$ Point for Plaintiff as Side 1:
>
> Where: Plaintiff and defendant entered into a nondisclosure agreement.
> Even though: Employee defendant was sole developer of plaintiff's product.

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Plaintiff should win a claim for Trade Secrets Misappropriation.

Cite: Structural Dynamics Research Corp. v. Engineering Mechanics Research Corp., 401 F. Supp. 1102 (E.D. Mich. 1975).

⟸ Response for Defendant as Side 2:

Structural Dynamics Research Corp. v. Engineering Mechanics Research Corp. is distinguishable because:

In Structural Dynamics, defendant received something of value for entering into the agreement. Not so in Amexxco.
In Structural Dynamics, plaintiff's former employee brought product development information to defendant. Not so in Amexxco.
In Structural Dynamics, the nondisclosure agreement specifically referred to plaintiff's product. Not so in Amexxco.

⟹ Rebuttal for Plaintiff as Side 1: None.

3-Ply Argument for *Amexxco* Case

⟹ Point for Defendant as Side 1:

Where: Employee defendant was sole developer of plaintiff's product.

Even though: Plaintiff and defendant entered into a nondisclosure agreement. Plaintiff adopted security measures.

Defendant should win a claim for Trade Secrets Misappropriation.

Cite: Amoco Production Co. v. Lindley, 609 P.2d 733 (Okla. 1980).

⟸ Response for Plaintiff as Side 2: None.

⟹ Rebuttal for Defendant as Side 1: None.

Hypo also suggests hypothetical variations of the problem situation that would help or hurt the associate's side:

Suggested Hypotheticals for *Amexxco* Case

Plaintiff's position would be strengthened in following situations:

Suppose:

Defendant's access to plaintiff's product information saved it time or expense. Plaintiff's former employee brought product development information to defendant.

Cf. Analogic Corp. v. Data Translation, Inc., 358 N.E.2d 804 (S. J. C. Mass. 1976)

Defendant's access to plaintiff's product information saved it time or expense. Defendant paid plaintiff's former employee to switch employment. Plaintiff's former employee brought product development information to defendant.

Cf. Space Aero Products Co. v. R. E. Darling Co., 208 A.2d 74 (Ct. App. Md. 1965)

Defendant's access to plaintiff's product information saved it time or expense. Defendant paid plaintiff's former employee to switch employment.

Cf. Telex Corp. v. IBM Corp., 510 F.2d 894 (10 Cir. 1975)

Plaintiff's former employee brought product development information to defendant.

Cf. Structural Dynamics Research Corp. v. Engineering Mechanics Research Corp., 401 F. Supp. 1102 (E.D. Mich. 1975)

The kind of output that Hypo generates—citations, arguments, and suggested hypotheticals—would have been extremely useful in preparing the associate's memorandum. For example, the 3-Ply Arguments would warn the associate of a good case for his opponent: the *Amoco* case that is exactly on point to his problem.

None of the other search methods can tailor the selections of relevant cases to the specific facts of the problem situation or explain their utility by illustrating how they can be employed in arguments about the problem. Using any of them, the associate would have to decide how the cases retrieved can be used in arguments about a particular fact situation, whether the opponent might have more persuasive cases to cite, and whether additional but as yet unknown facts in his client's situation might seriously affect the argument. Moreover, in order to use the other methods, he must perform a legal analysis of his fact situation and anticipate what he is looking for before he can find it. With Hypo, the program performs the analysis.

Alas, the story does not have a happy ending. Since the associate's firm did not have Hypo, he was late for the opera. His future father-in-law was so incensed that the wedding was postponed. Although the associate never found the *Amoco* case, Amexxco's house counsel did

(her office had Hypo), and she decided that she no longer needed the services of a high-priced New York law firm. The firm thus lost a valuable corporate client. Although the associate never became a partner, he is considering returning to graduate school. Computer science, maybe?

3 Introduction to Hypo and Its Adversarial Reasoning Process

The Hypo computer program assists attorneys in evaluating disputes about trade secrets law. For each side, Hypo generates the best arguments, citing the most relevant legal cases in its database, and poses hypotheticals to show how to strengthen or weaken a side's argument.

Hypo is a case-based reasoning program. It employs actual legal cases in its database to analyze problem disputes. Given a description of a legal dispute, the program compares the problem to relevant cases, selects the most analogous cases, and cites them in arguments. It draws simple factual analogies between the problem and precedents, distinguishes precedents, cites counterexamples, and poses hypothetical variations of the problem to spur an attorney to focus on important additional facts that would strengthen or weaken the arguments. In short, Hypo symbolically compares and contrasts the problem situation and cases in its case database.

Hypo is also an adversarial reasoner. It makes competing arguments on how to decide a new problem. Instead of presenting the one "right" answer for how the case should be decided, it presents competing reasonable answers, citing the best cases for each side and showing the responses to those arguments.

The main inputs to the program are problem situations describing legal disputes. An attorney or assistant types in a description of the problem situation at the computer keyboard. Since the Hypo program does not have the ability to understand English, the user must input the problem situation in a specially designed language for representing legal disputes. The program has a menu-driven editing environment to guide the input process.

Hypo's primary outputs are a summary of the best cases for each side to cite, arguments citing each side's best cases and illustrating how to respond to them on behalf of the opponent, and hypotheticals showing how the problem situation could be modified to strengthen or weaken a side's argument.

Between inputs and outputs Hypo symbolically compares the problem dispute to cases in its Case Knowledge Base (CKB) in order to select the most analogous cases for each side. Hypo's process of reasoning adversarially with cases comprises the following general steps:

1. Analyze the problem situation and retrieve prior cases that share some important similarities with the problem.

2. Select the precedents most similar to the problem. (These precedents may have contradictory outcomes.)

3. For each of the most similar precedents, justify deciding the problem situation like the precedent by drawing an analogy emphasizing the similarities between them. (Justifications conflict where competing analogies may be drawn to prior cases with opposite outcomes.)

4. Attack conflicting justifications by distinguishing the associated precedent, citing other precedents as counterexamples, or posing hypotheticals.

5. Decide the problem situation, to the extent possible, by evaluating the best precedent-citing arguments pro and con alternative decisions and explain the decision by comparing the arguments and precedents.

This process, called the adversarial case-based reasoning process, tracks how attorneys argue with precedents. It deals with such concepts of vital interest to attorneys as relevant similarities and differences among cases, selecting the cases most relevantly similar to a problem, distinguishing precedents, and posing counterexamples and hypotheticals.

In order for Hypo to reason adversarially with cases, these legal concepts have been defined computationally; that is, they have been defined so that the program can compute them. Although Hypo's computational definitions of these legal concepts do not capture all aspects of the ways in which attorneys argue with legal precedents, they do capture an important subset. The computational definitions are good enough to enable Hypo to generate outputs that are legally reasonable and useful.

In Hypo, the legal concepts of relevant similarities and differences, most relevant cases, distinguishing, and counterexamples are defined in terms of factors. Factors are a kind of expert knowledge of the commonly observed collections of facts that tend to strengthen or weaken a plaintiff's argument in favor of a legal claim.

Each kind of legal claim has its own set of factors. Authors of legal treatises and law review articles regularly identify factors to look for in assessing the strength or weakness of a party's position and often footnote cases that exemplify the factors. The factors that affect trade secrets

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misappropriation claims have been gleaned from legal treatises and law review articles. The drafters of the Restatement (appendix B), for example, employed factors to supplement their definition of trade secrets. An example of a factor that affects a claim for trade secret misappropriation is the extent to which a plaintiff has taken security measures to protect its secret; the more security measures that were taken, the better is the plaintiff's argument. Another factor involves disclosing the secret. The fewer outsiders to whom the plaintiff has disclosed the secret, the better the case is for the plaintiff.

One can think of examples of factors for almost any legal claim. The plaintiff in a medical malpractice suit is helped to the extent that a physician failed to take steps to warn the patient of the consequences of a proposed course of treatment. In a suit for breach of contract, the alleged breacher is helped to the extent that it received nothing of value (no consideration) in exchange for entering into the contract. In a prosecution for murder, the defendant who asserts self-defense is hurt to the extent that time has passed between the threat and his response.

Factors have magnitudes to reflect the fact that a particular case may be a more or less extreme example of the factor. Disclosure to one hundred outsiders is worse for the trade secrets plaintiff than disclosure to six outsiders. No warning at all is worse for the physician than providing a written description of the possible consequences. Nothing of value received in the exchange is worse for the contract claim plaintiff than receipt of a peppercorn. Two days between threat and response is worse for the criminal defendant than two minutes.

The magnitude of a factor should be distinguished from its weight. A factor's weight is some kind of measure of the support it lends to a conclusion that the plaintiff should win a claim. While attorneys probably will agree that for any given kind of claim, factors can be identified, they will disagree how much weight the various factors have.

Hypo's model of legal analysis involves factors. When an expert attorney analyzes a problem, it is assumed that he or she determines which legal claims may apply to the case and identifies the factors in the case that favor or hurt the plaintiff on each of those claims. A judge's task is to assign an outcome to a problem, that is, to decide that plaintiff has won or failed to win a particular legal claim. The task of an attorney is to persuade the judge what outcome to assign. As legal experts, attorneys know for a given kind of claim the factors that apply, as well as

the side that the factors favor, and they emphasize those factors, and precedents exemplifying the factors, in their arguments to the judge.

Hypo performs a legal analysis of a problem situation in much the same way. In Hypo, factors are represented with Dimensions. A Dimension is a general framework for recording information about a factor for the program to manipulate. Hypo has a library of Dimensions for the claim of trade secrets misappropriation, each associated with a factor that identifies a common strength or weakness in a trade secrets claim. Each Dimension has a set of prerequisites used to test if the factor applies to a case and a range of values over which the magnitude of the factor in a particular case may vary.

In Hypo, a precedent is treated as a historical collection of factors, each with a particular magnitude, to which some authoritative decision-maker, the judge, has assigned an outcome, either in favor of or against the plaintiff with respect to a legal claim. A problem situation, after Hypo analyzes it, is also treated as a collection of factors but one whose outcome has not yet been decided.

In problem disputes as in precedents, the factors generally conflict. Some of the factors favor the plaintiff on a particular claim, and others favor the defendant. The question for the judge, and for attorneys who try to influence the judge, is how to resolve the conflicts among the factors found in a case.

In general, in the legal domain, there is no one answer to the question of how to resolve the competing factors in a particular case. The law has no analytic model or procedure for resolving the competing factors, no weighting scheme or function that yields the "right answer" through some deductive or mathematical process. Instead judges expect an attorney to make a reasonable argument citing cases that justifies a resolution of the conflict favorable to the client. Since there are two sides to the argument, the legal experts usually come up with conflicting reasonable arguments.

Precedents are used to support arguments about how to resolve conflicting factors in a current problem. Since the precedent is a collection of factors to which some judge has assigned an outcome, the precedent may be cited by an advocate to support the assertion that the conflict among the same factors in the current dispute should be resolved in just the same way.

That attorneys use precedents to justify a resolution of conflicting factors in a current dispute is a simplifying assumption that has been made in designing Hypo. Attorneys, of course, make other uses of precedents—for example, in building more theoretical analogies between cases. Hypo cannot draw those kinds of analogies. Although Hypo draws only simple factual analogies in terms of shared and unshared factors, its model of arguing with precedents is good enough to generate intelligent, helpful outputs.

The Venn diagrams shown in figure 3.1 illustrate how Hypo uses factors. For a particular kind of legal claim, Hypo represents the important factors that favor an outcome for or against a side. Figure 3.1a shows two kinds of claims; claim 1 might be a trade secrets claim and claim 2 a copyright claim. For claim 1, the figure indicates all of the important factors that favor a positive outcome for a side (+) and those that favor a negative outcome (−). In other words, some of the factors favor a positive outcome for plaintiff on a trade secrets claim (+), and some favor a negative outcome for plaintiff (−), that is, favor a decision for defendant on the claim. Claim 2, a copyrights claim, would involve different (although possibly related) factors.

A problem is treated as a collection of usually competing factors. Figure 3.1b shows a problem P and its set of competing factors. Although deciding problem P's outcome, $O(P)$, entails resolving the competing factors, the question is how. Since the law usually has no analytic model or procedure for resolving the conflict, attorneys argue with precedents. An adversary hopes to find a precedent that has the same set of conflicting factors as in the problem situation so that he or she may argue that the same outcome should be assigned to the problem as in the precedent. In figure 3.1c, case A can be cited in an argument that problem P should have a positive outcome for claim 1 because case A had a positive outcome, $O(A) = +$, and shared some of the same factors with the problem.

Hypo's definitions of relevant similarities and differences among cases are based on this idea that precedents are used to justify the resolution of competing factors. The set of relevant similarities between two cases is the set of factors that the two cases share. The set of relevant differences between two cases contains factors not shared in the cases that favor opposite outcomes and differences in the magnitudes of shared factors.
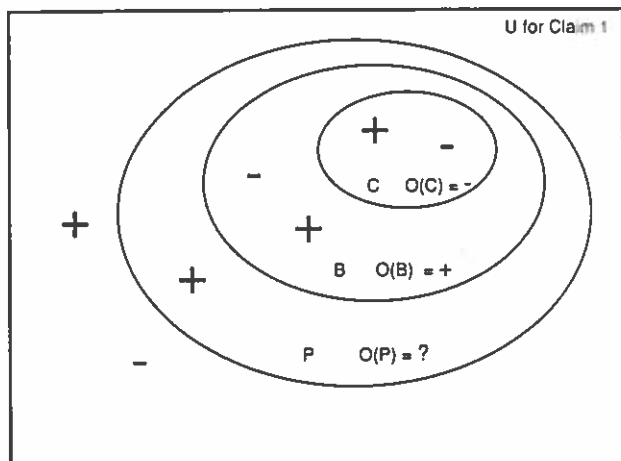
Figure 3.2
Defining Relative Similarity of Cases in Terms of Factors

an arguer cited case C on behalf of a negative outcome in the problem situation, an opponent could cite case B as a counterexample. In a sense, case B trumps case C, it has the same factors in common with P that case C does and then some and had the opposite outcome.

Since Hypo represents the context in which a precedent is used in a legal argument, it can also determine the differences among cases that are salient in a particular context. For instance, in figure 3.3, the question is whether case D is relevantly similar to problem P. Although case D shares some factors with problem P, there is one unshared factor. Does that mean that the case is not relevantly similar? It is a hard question to answer, especially if, as is usually the case in law, there is no analytic theory of a domain to resort to. By taking into account the context of how a case is to be used in an argument, however, some intelligent assessments of similarity can still be made. For example, if case D is to be cited in support of an argument that P should have a positive outcome, then the negative unshared factor does not matter; in fact, it even helps the argument. Its presence in case D implies that the shared factors so strongly favored a positive outcome that they overcame the negative factor, an obstacle not even presented in problem P. This kind of information can also be used to select among cases. Case D is a better
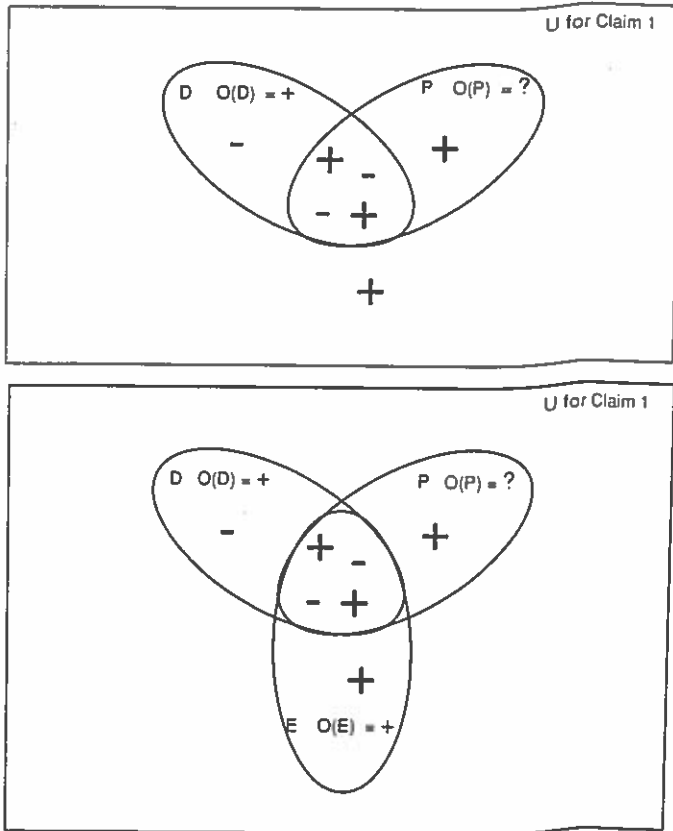
Figure 3.3
Reasoning about Significance of Differences

case to cite on behalf of a positive outcome than case E because of E's unshared positive factor.

These examples illustrate the kind of reasoning that Hypo performs with cases and, in particular, how Hypo symbolically compares cases. In performing each step of its adversarial case-based reasoning process, Hypo is comparing or modifying cases in terms of factors as represented by its Dimensions.

In step 1 of its adversarial case-based reasoning process, Hypo analyzes a problem by determining what factors (as represented by Dimensions) apply. Using the factors as an index into the cases in the CKB, Hypo
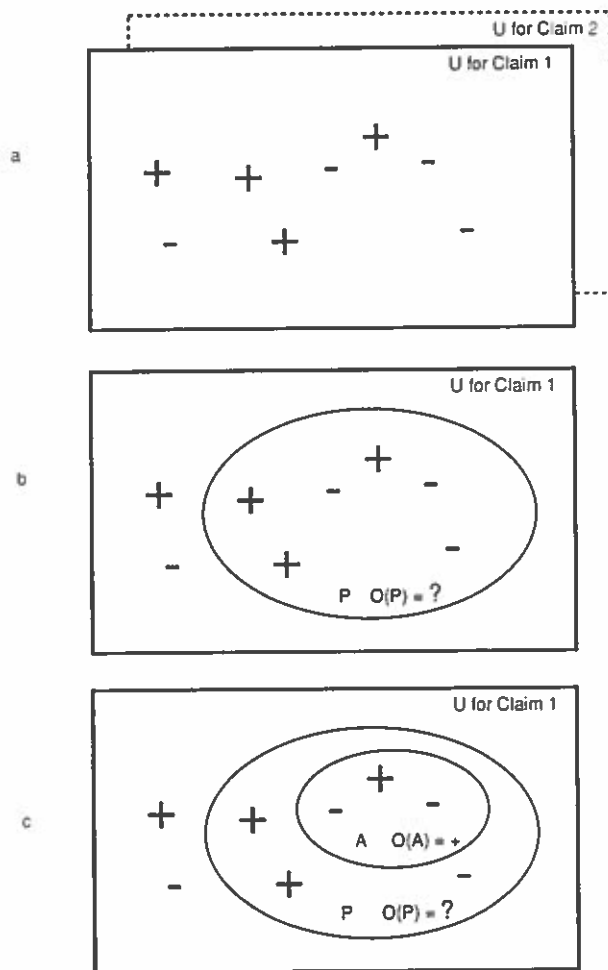
Figure 3.1
Precedents Resolve Competing Factors. a, Some factors favor a positive outcome
($+$) for plaintiffs on Claim 1, and some favor a negative outcome ($-$). Claim 2 may
involve other factors. b, A problem P is a collection of competing factors. c, Case A
is on point to P because they share factors. Case A has a positive outcome
($O(A) = +$) and can be cited for a positive outcome in P. The unshared negative
($-$) factor distinguishes A from P. It favors a negative outcome in P. The unshared
positive factors are not distinctions. They favor a positive outcome in P.

Hypo treats the shared factors as relevant similarities that justify treating the new problem like the old case. The old case was decided because, or in spite, of the factors that applied to it. Some of those factors also apply to the new problem and justify the same outcome. Similarly the relevant differences are reasons that the two cases should be decided differently. The unshared factors make a side's position stronger in one case than in the other and thus may cause the case to be a weaker justification in a legal argument. In figure 3.1c, for example, case A is relevantly similar to the problem P because of the fact P. In this instance, case A has one relevant difference tive factor that applies to P but not to A. If one were c argument for a positive outcome in P, one would emp factors. The opponent would emphasize the unshared a relevant difference. That is what Hypo does when a 3-Ply Argument and responds for the opponent by case.

The important legal concepts of a case's being on poi a best case for a side to cite, or a counterexample to also defined in terms of factors. In Hypo, a past case respect to a problem if it is relevantly similar, that one factor with the problem situation. One precedent with respect to a problem than another precedent if similarities (that is, its set of shared factors) includes precedent as a proper subset. Cases that are most on relevantly similar of all the cases in the CKB; there CKB whose set of relevant similarities includes that of a most-on-point case. Hypo may cite a case as a precedent in an argument on behalf of a side if the case is on point and at least one of the shared factors favors that side. With Hypo, as in law, the more on point a case is, the better it is to cite it in an argument. For example, in figure 3.1c case A is on point with respect to problem P because it is relevantly similar. In figure 3.2, case B is more on point than case C because case B has every factor that case C shares with problem P and shares other factors with P that case C does not. In other words, case C's set of factors shared with P is a subset of those of case B.

Hypo is programmed to look for cases to cite as counterexamples in response to an argument citing a precedent. Hypo's various kinds of counterexamples are also defined in terms of factors. In figure 3.2, if

retrieves any case sharing a factor with the problem. These cases are relevantly similar. Hypo selects the most similar precedents in step 2. It orders the on-point cases according to the inclusiveness of their sets of factors to find those with the greatest overlaps of factors shared with the problem. In steps 3 through 5, Hypo draws analogies between the problem and a most-on-point precedent by reciting the factors that they share. It distinguishes a precedent by focusing on relevant differences, the unshared factors. The various kinds of counterexamples that Hypo cites in response to a precedent are defined in terms of overlaps of factors or differences in factor magnitudes. Similarly, Hypo hypothetically modifies the problem situation by adding, subtracting, or exaggerating factors.

4 The Hypo Program: An Overview

This chapter presents an overview of the Hypo program and how it represents and applies legal case precedents and hypothetical cases to assist an attorney in evaluating and making arguments about disputes involving trade secrets law. The Hypo program's key elements include its

- Case Knowledge Base (CKB), a structured database of actual legal cases,

- Dimension Index, an indexing scheme employing Dimensions for retrieval of relevant precedents from the CKB,

- Dimensional Analysis, methods for analyzing a problem (referred to as the current fact situation, or cfs) and retrieving relevant cases from the CKB,

- Case Positioning, methods for positioning the problem situation with respect to relevant precedent cases in the CKB and finding the most-on-point cases,

- Symbolic Case Comparison, methods for comparing and contrasting cases (e.g., citing, distinguishing, finding counterexamples),

- Hypotheticals, methods for perturbing the current fact situation to generate hypotheticals that test the strength of an argument as new damaging facts come to light and existing favorable facts are discredited,

- 3-Ply Arguments, methods for generating 3-Ply Arguments to dry run and debug a legal argument and to characterize the strength of available precedents using citation labels in a manner familiar to attorneys,

- Explanation, a framework for explaining a decision and its alternatives by citing precedents as examples, critically comparing the precedents' strengths using 3-Ply Arguments, and posing hypothetical variations of the current fact situation and precedents to demonstrate critical features that, if different, would lead to different conclusions.