

# The Fraunce (1588) model of case-based reasoning

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## ABSTRACT

Fraunce (1588) proposed the first diagrammatic model of case-based reasoning that sets out the extended arguments of the parties and the judgment. It shows the actual complexity of logic in legal expertise, and reveals possibilities and difficulties of automation of legal reasoning.

## Keywords

Logic, extended argument, deduction, induction, legal expertise, transparency, integration, model, graphical representation, litigation, case-based reasoning, rule maps, argument maps, advice maps, glosses.

## 1. INTRODUCTION

The earliest model of case-based legal logic was developed by an Elizabethan lawyer of Gray's Inn, Abraham Fraunce (1588, pp.125r-139r). It was noted by Leith and Hoey (1998, p.292) that Fraunce's model of the whole reasoning in a case has not been studied or adopted by contemporary legal knowledge engineers. This may have been due to the lack of a translation of the Norman French and Latin in which it was written. Sybil Jack has now provided the translation necessary for a closer examination of Fraunce's model and some of this translation is here published for the first time. It might be said that Fraunce was a forerunner of legal knowledge engineering in the same way that Pascal was a forerunner of computer technology.

Fraunce studied Ramist logic at Cambridge University and applied it, in a diagrammatic way, to Plowden's report of an Exchequer mining matter, namely, Earl of Northumberland's Case (1567). Fraunce's 29 pages of logic diagrams of the arguments of the opposing parties, namely Queen Elizabeth I and the Earl respectively, and of the judgment of the Exchequer Court, model the various forms of logic that were integrated as the legal expertise in the case.

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It is interesting to note that Fraunce's sixteenth century work on legal logic reveals the nature of legal expertise at a time when theoretical reasoning in the English legal system was in its infancy (Gray, 1997, pp.123-6). Yet his 29 pages of case reasoning diagrams (pp.125r-139r) for the Earl's case resemble an extensive structure like that of the Latent Damage Law tree constructed by Capper and Susskind (1988, p72) four hundred years later.

## 2. THE FRAUNCE MODEL

Most of Fraunce's diagrams represent the arguments for the parties. The case involved a dispute between the Queen and the Earl over entitlement to the gold and silver in mines on land that was granted to the Earl by Act of 4 and 5 Philip and Mary.

Figure 1 is Fraunce's tree of the Exchequer judgment (p.139r). Like a botanical classification system, it contains, from the root at the left to the leaves at the right, categories of the court's major findings. It follows the method, specified by Peter Ramus (1543, 1969 pp.54-5) as the method of Aristotle, whereby the most general matter is placed first and the special or singular last. Details of the Exchequer findings appear in the vertical column of leaves at the far right of the judgment tree. The jurisprudential classification system can be read from left to right and the order of specific findings of the Court can be read from the most general at the top to the most special at the bottom in the final column at the right. The scheme of the summary is elegant and clarifies the relative reasoning in the judgment. It might be seen as a precursor to Conover's (1989) three dimensional models of jurisprudential systems.

The diagrams of the arguments of the parties reveal a variety of argument forms running vertically and horizontally. As extended arguments, they have a mix of induction, including analogies, and deduction in the form of categorical syllogisms.

## 3. EXTENDED ARGUMENT

Fraunce shows in Figures 2 and 3 (p.125r and d), that the Queen's case commences with an extended argument from

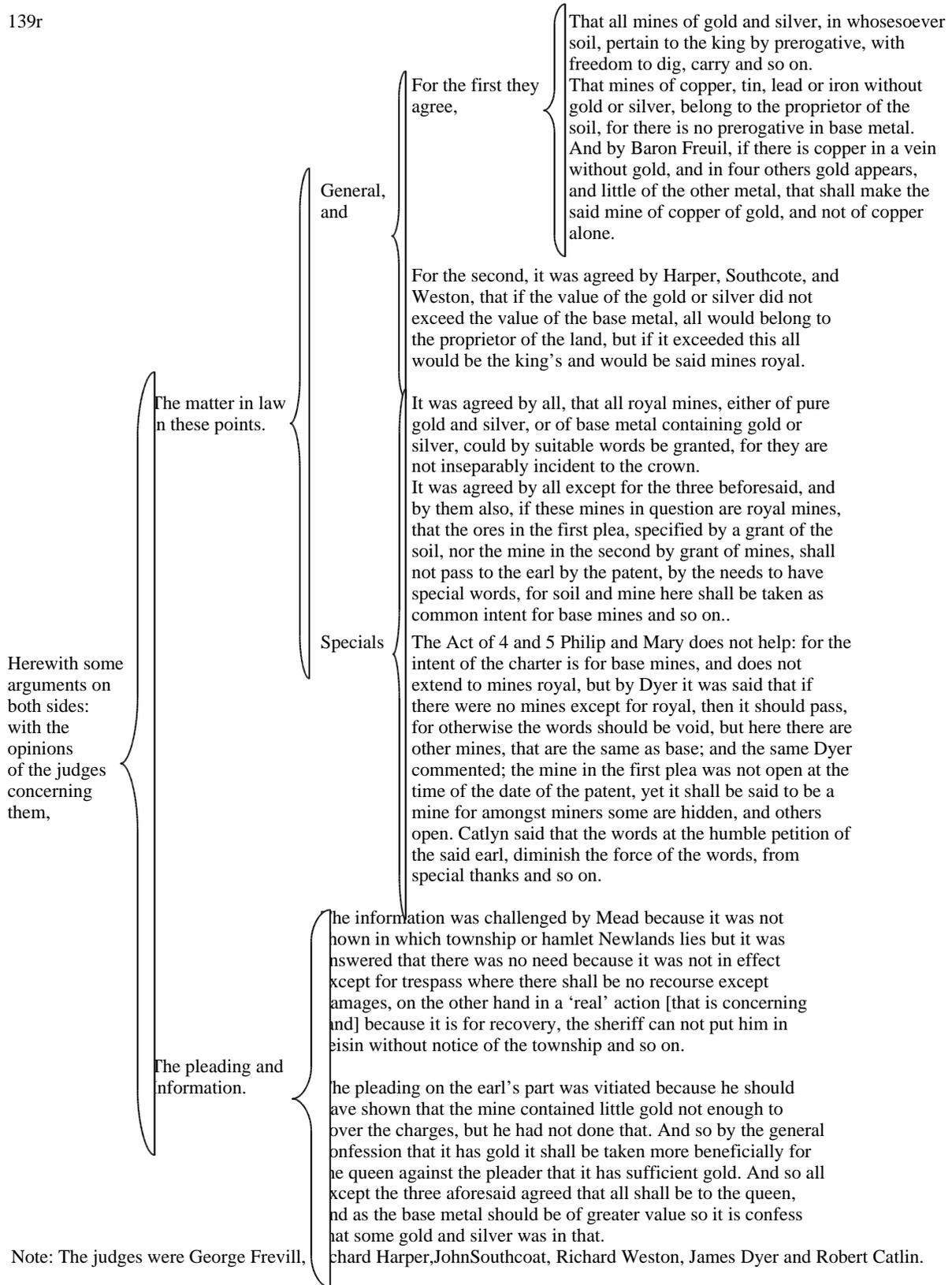


Figure 1

125r

The first is derived from the parallel excellence of the king and of these metals and so on, thus,

The most excellent things of the earth belong to the most excellent person who is the king: proved by the like.

The most excellent things in the sea and waters belong to the king by specific law. A A

Therefore those of the earth, as gold and silver are likewise his,

But gold and silver are the most excellent things of the earth:

Therefore gold and silver belong to the king (and so on) and the mines containing them (and so on).

Figure 2

125d.

AA  
This first part of the enthymeme is confirmed by a new syllogism, containing an argument from the special, thus constituted.

The common Law appropriates to the king sturgeons and whales which are sea creatures in England: thus the arms of the sea: and this is proved by two witnesses.

But of sea things, the fishes, and of the fishes, the sturgeon and whales are the most excellent. Therefore the common law assigns to the king the most excellent things of the sea and the waters

The first is the Treatise of Praerogativa regis chapter 11 (which is not new law but a declaration of the common law) thus the king shall have whales and sturgeons taken at sea, or elsewhere within the kingdom

The second is from Britton which was written a long time before the treatise De Praerogativa Regis and in his chapter on 'trouvailles' (things found) he says that the king will have the fishes by prerogative, by the common law of the time.

The second argument is from the principal and co-adjunct causes: thus the king and the treasure: that both should run together for the maintenance of the realm:

It is Reason that he who has the rule and care of the people as principal cause, which he cannot defend without helping and instrumental causes, he should have these aids and helping causes.

But the office of the king that the law has appointed him to is to defend his subjects: and the treasure, which is the term for the sinews of war, is the cause which helps him to defend them against all hostilities.

Therefore it is convenient that the king should have the treasure and mines of gold and silver, in which this treasure consists.

Figure 3

legal principle. There are three sub-arguments involved here, two deductive and one inductive, clearly differentiated in the diagram, with sub-arguments moving from top to bottom of the page and the extended argument structure moving from initial premises on the right to a final conclusion on the left. A contemporary logician would probably present the whole structure vertically, starting from the initial premises, rather than horizontally; but otherwise Fraunce's presentation is completely modern.

The queen's arguments start out with the *Treatise of Praerogativa regis* listed as an authoritative declaration of the common law, to establish that the monarch 'shall have whales and sturgeons taken at sea or elsewhere within the kingdom.' [p.125d]

It is then argued that 'of sea things the fishes and of the fishes the sturgeons and whales are the most excellent. Therefore the common law assigns to the [monarch] the most excellent things of the sea and the waters.'

Fraunce's identification of the argument as a syllogism suggests the classic categorical syllogism consisting of three propositions, each relating two classes or categories of things, and containing three different terms, each of which appears twice in distinct propositions.

In modern terms [of predicate logic] it could be represented as follows:-

[p1]  $(\exists x) ((Sx \vee Wx) \supset Kx)$

Everything which is either a sturgeon or a whale is the property of the monarch

[p2]  $(\exists x) (Ex \supset (Sx \vee Wx))$

[similarly, the material implication should probably be material equivalence here; ie,  $(\exists x) (Ex \supset (Sx \vee Wx))$ ];

Everything which is a most excellent sea creature is either a sturgeon or a whale [and vice-versa]

[ic1]  $(\exists x) (Ex \supset Kx)$

So everything which is a most excellent sea creature is the property of the monarch

In Aristotelian terms,  $(Sx \vee Wx)$  is the middle term.

$Kx$  is the major term and  $Ex$  the minor term.

This is a valid deductive argument.

This [intermediate] conclusion then becomes the premise for a second sub-argument. Because the most excellent things of the sea belong to the monarch by law, so do the most excellent things of the earth. This is clearly an inductive argument, though it is not so clear precisely what sort of induction is involved. [p.125r]

Probably it is best regarded as an argument from analogy:

[p1] the land [of the kingdom] is like the sea in being an integral part of the monarch's domain

[p2] the monarch owns all of the most excellent things of the sea [by law, the conclusion of the first argument]

[ic2] so the monarch also owns all of the most excellent things of the earth.

Again, this conclusion becomes a premise in the final, deductive argument of the chain of reasoning. Because all of the most excellent things of the earth are the monarch's property, and gold and silver are the most excellent things of the earth, the gold and silver [of the kingdom] belong to the monarch.

[p1]  $(\exists x) (Ex \supset Kx)$

All things are such that if they are most excellent things of the earth [middle term] then they are the property of the monarch [major term]

[p2]  $(\exists x) ((Gx \vee Sx) \supset Ex)$

Gold and silver [minor term] are most excellent things of the earth

[fc]  $(\exists x) ((Gx \vee Sx) \supset Kx)$

So gold and silver are property of the monarch [the x class here is the class of things, or things capable of being property]

The second premise seems unproblematic in the circumstances. And the argument is valid.

Next, as Fraunce shows, the queen's representatives move on to what would today be called a policy argument. [p.125d]

To paraphrase, again putting the argument in the form of a categorical syllogism:

[p1]  $(\exists y) (Ry \supset My)$

All effective rulers are rulers with access to the material means of ruling

[p2]  $(\exists y) (My \supset (Gy \ \& \ Sy))$

All rulers with access to material means are rulers with access to the gold and silver of their kingdoms [access to gold and silver is a necessary condition of access to material means]

[c]  $(\exists y) (Ry \supset (Gy \ \& \ Sy))$

So all effective rulers are rulers with access to the gold and silver of their kingdoms

[the y class here is the class of people or rulers][

#### 4. EXPERT COMPLEXITY

Thus, Fraunce clearly shows how these two different lines of reasoning, from law and from policy, converge upon the same conclusion, namely, the monarch's right of ownership of gold and silver within the territory of their kingdom. This, in turn, becomes a premise for further extended argument. Fraunce's diagrams are argument maps, not rule maps (cf. Gray, 1988, 2002), or advice maps like the Latent Damage Law tree. However Fraunce's argument maps include rules of law and show arguments that support the existence of a rule.

By comparison to the arguments of the parties, the judgment is simple, and extracts the deciding factors in the case. The content of Fraunce's diagrams integrate legal logic arguments, litigation procedure and a scheme of presentation. Fraunce nests his diagrams as the legal reasoning is too extensive for a single page. His case diagrams could be used as a case gloss on any of the rules for which the case is an authority. Fraunce does appear to use a precedent case as gloss on an argument map. For instance, he (p.127r) notes in a paragraph outside his diagram, in relation to a point of argument in a preceding diagram (p.126d), the 'example' (cf. Detmold, 1984, p.179) of the case of Roger Chambernounge (1457-8), a nefarious taker of ore.

## 5. TRANSPARENCY

Through rendering the reasoning transparent, Fraunce's form of representation opens up such reasoning to critical analysis and assessment. The Earl's case has elements of non-monotonic logic, defeasibility argument, propositions of the ontology of law, of the epistemology of legal doctrine and of the epistemology of adjudication, as components of legal expertise (cf. Bankowski, White and Hahn, 1995, pp.12-13).

For instance, a point of legal ontology is made (p.126r) in the Queen's argument that, because the monarch needs gold and silver for the minting of coins, there is no royal power to grant the mining of gold and silver to anyone else. In the judgement there is a point of epistemology of adjudication, where there is a finding that the Earl has not proved the ratio of gold and silver to base metals so as to fall within the requirement of the rule that where the ratio of gold and silver to base is such that the cost of the process of separation would be greater than the value of the gold and silver, then there is no royal prerogative in relation to these deposits.

## 6. CONCLUSION

Fraunce's model of integrated legal expertise reflects the mix of science and art in legal reasoning. Where it is a science, it may be suitable for automation. Where it is an art, it may not be. In addition to the automation of a scientific core, a legal expert system may provide legal data to expand on the automation.

## 7. ACKNOWLEDGEMENT

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