Chapter 2

Legal Case Solving

2.1 Introduction

This chapter explores what is in legal case solving to get a better understanding of what this task implies. As in all other domains and disciplines, students have to learn to solve problems by actually and successfully solving problems. There is no other way. Even looking how the master does the trick and imitate her will not do the job, except in extremely simple cases. In law we are not in such a world. The fact that the novice has to perform something that she is not supposed to be able to do yet is paradoxical. However, it should be noted that we assume that the student has already mastered sufficiently the subject matter in terms of understanding and insight. A physics student should know Boyle’s law before solving problems about steam engines. A law student should know the content and meaning of the basic concepts in administrative law, concepts as interested party and administrative authority, before solving problems about objection or appeal. A novice learns to solve problems by actually solving problems. There are two aspects related to learning problem solving. The first is that learning by doing requires a task to perform. To learn to solve legal cases the novice should be confronted with the task of legal case solving. This requires an analysis of the task to be able to determine how to perform this task in an exemplary manner. The analysis of what it takes to solve a legal case to be able to perform this task correctly is the subject of this chapter. The second issue in learning problem solving is how to facilitate the learning process. How to facilitate the process of learning to solve legal cases is the subject of Chapter 4.

The emphasis in problem solving literature is mainly on problem solving methods. However, our preconception is that the primary force that drives the problem solving process is not the problem solving method, but the domain knowledge.
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In our view the focus should be on domain knowledge instead of on problem solving methods. To try to found our preconceived notion we set out with introducing the basic problem solving terminology and with describing the various components that can be distinguished in the problem solving process. The framework may shed light on the role of the problem solving method and the domain knowledge in the problem solving process. This theoretical framework is also used to examine legal case solving as described in different theoretical sources. Expressing these different views in the same vocabulary enables us to compare the views and to indicate deviations and deficiencies. We are also interested in how novices and experts actually solve legal cases. As we stated in Chapter 1 novices apparently do not use a systematic approach in solving legal cases. We carried out an experiment to examine how novices and experts solve legal cases, what difficulties they encounter during legal case solving and what we may detect as the cause for these difficulties. These findings are used to determine the role of both problem solving method and domain knowledge in legal case solving, to list the difficulties experienced in solving legal cases and to come up with solutions for these problems. Our hypothesis is that difficulties in legal case solving are first of all caused by insufficient mastery of, or insight in, the subject matter.

This chapter is arranged as follows. In paragraph 2.2 we first introduce the basic terminology for our theoretical framework. In paragraph 2.3 different theoretical sources with different views on legal case solving are consulted and compared using the framework. The experiment and the findings are described in paragraph 2.4.

2.2 Problem Solving

Solving a legal case involves the construction of a legal solution for a specific problem situation using legal rules as the problem solving devices. The aim of this chapter is to improve the understanding of legal case solving. To enlarge our insight in legal case solving it is inevitable to review research on problem solving in general. However, the problem solving research field is extensive and broad. Therefore we restrict ourselves to problem solving research in the field of cognitive psychology and artificial intelligence.
The focus will be on problem solving research in the field of cognitive psychology and artificial intelligence for the following reasons:

- Cognitive psychology actually studies thinking or problem solving processes.
- Cognitive psychology and artificial intelligence research represent two views on how to study problem solving\(^1\). Cognitive psychology, in particular research by Newell & Simon, has been an important source of inspiration for artificial intelligence and vice versa. Artificial intelligence is concerned with the automation of problem solving. Here the focus is on what it takes to solve a problem, what actually is a problem or a solution in problem solving. Artificial intelligence strives to build problem solvers as well as to understand them.
- Artificial intelligence has to specify the components in problem solving very precisely and explicitly to be able to build problem solvers.

Our basic objective is to describe the major components in problem solving as distinguished in these two fields to enlarge our understanding of legal case solving. We set of with introducing human problem solving, followed by a description of its artificial counterpart and a description of the basic problem solving concepts ‘problem’ and ‘problem solving method’.

### 2.2.1 Human Problem Solving

In psychology, the term problem solving appeared in the sixties and seventies in particular inspired by the work of Newell & Simon (1972). Before, problem solving was rather categorized as thinking or reasoning. At the beginning of the 20th century studies of thinking, such as published by, for example, Wundt (1911), von Ebbinghaus (1919) and Bartlett (1932) were overshadowed and even put into discredit by the behaviorist paradigm.

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\(^1\) The emphasis in artificial intelligence research is on the cognitive side, involving knowledge tasks, more than on the behavioral side, involving sensory and motor tasks. Newell & Simon represent the cognitive part of artificial intelligence. Connectionism and pattern matching research focus on the behavioral part, represented by, for instance, Minsky & Papert (1969) and McClelland & Rumelhart (1986).
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Behaviorism was the predominant approach in the 1940 - 1960 period\(^2\). In particular the use of interpretations of think aloud protocols, which were hard to validate by independent data, was strongly criticized by behaviorists. However, as a consequence the focus of research shifted from the use of knowledge, i.e. thinking, to the (principles of) acquisition of knowledge, i.e. learning. With the advent of automatic symbolic processing (computers and computer languages) new means for checking the validity of interpretations of think aloud data became possible. Models of mental activities could be put to test, at least, it could be assessed whether they worked, i.e. actually behaved. This was an advantage over behaviorist theories, because their theories could not exhibit other behavior than matching data (aggregated over many subjects).

The work of Newell & Simon at the end of the sixties and the beginning of the seventies became the standard theory on human problem solving. Their theory is both based on Artificial Intelligence research and empirical cognitive studies of human behavior. Newell & Simon (1972) view a problem solving system (being either a natural or an artificial system) as an information processing system.

\(^2\) Cognitivism studies the complex mental processes that are assumed to play an important role in determining human behavior. Behaviorism assumes that the only valid way to obtain 'unbiased' insight in human mental activities is by studying its behavioral manifestations. The workings of the mind that underlie these behaviors is not studied, all uses of mental constructs in explaining behavior are rejected. It was thought that by systematically varying the conditions of human behavior and observing the behavior itself, 'laws' could be induced that would give a fully parsimonious account of mental behavior without resorting to a priori, biased, introspective concepts. Although Watson and Skinner are always bracketed together, their views differ considerably. Behaviorism was founded in 1913 by Watson who stated that human behavior can be described in terms of stimulus-response patterns. However, it has been Skinner who really developed the field by introducing the idea of operand behaviorism. Skinner addresses behavior and the effect this behavior has on the environment. Skinner states that future behavior is shaped by the consequences of our present behavior. Behaviorism does not deny that cognitive processes play a role and that research into these internal processes is important. However, in the beginning of behaviorism there were no techniques to test assumptions on internal processes, as computers. Later on Skinner stated that internal processes should be the subject of physiology.
They describe problem solving as searching for the appropriate operators, being performable actions, to reach a goal. This search takes place within a problem space. The problem space is a description of the initial state of the world, the goal state and the set of all possible intermediate states between the initial and goal state. The initial state is a description of the problem based on all the knowledge a subject has available before starting to solve the problem. The goal state is a description of the state in which the problem is solved. The intermediate states are situations with partial knowledge about the goal state. Operators make it possible to go from one intermediate knowledge state to another. The knowledge available to the subject determines what actions she can perform, that is how successful she will be in solving the problem.

In searching for a performable action a problem solver can use problem solving methods. These methods can either be general or domain specific. General methods are generally applicable, where a domain specific method is tailored to solve problems typical for a specific domain.

2.2.2 Artificial Problem Solving

Artificial intelligence (AI) is the branch of computer science that is concerned with the automation of intelligent behavior. The two most fundamental concerns of AI researchers are knowledge representation and search, or reasoning i.e. making inferences on the basis of knowledge and states in the world.

Knowledge representation addresses the problem of expressing knowledge required for intelligent behavior in a (semi)formal language, i.e. one suitable for computer manipulation. By systematic searching problem states as described by a knowledge representation formalism, problems can be solved.

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3 The term reasoning is often used instead of the term search. It is argued that you search for something that is in principle already there, you search to find your way along the paths that actually exist. Reasoning, making inferences, however may indicate that the paths are not really there, but that they are constructed by derivation. Computationally, however, these two views are equivalent. We may also use the term search as it is used by Anderson in describing how to learn problem solving; the subject of Chapter 4.
Newell & Simon (1972) have argued that this is the essential basis of human problem solving. Artificial problem solving is a subdiscipline within AI that is specifically concerned with the automation of problem solving behavior. The research in this field first focused on automated reasoning and theorem proving. The research was responsible for much of the early work in formalizing search algorithms and developing formal representation languages.

2.2.2.1 General problem solvers

A wide variety of problems can be attacked by representing the problem description and relevant background information as logical axioms and treating problem instances as theorems to be proved. The first reasoning programs were the Logic Theorist (Newell & Shaw, 1957) and the Geometry Theorem Prover (Gelernter, 1959). McCarthy (1958) described a hypothetical program the Advice Taker that was also designed to use knowledge to search for solutions to problems, this program used general knowledge of the world. The main theme in the Advice Taker approach was the clean separation of the knowledge (in the form of rules) and the reasoning component. In 1961 Newell & Simon presented their General Problem Solver (GPS), a program designed to imitate human problem solving. This research program is continued to this day e.g. in the form of the SOAR architecture/programming environment. They used a general-purpose search mechanism to connect basic reasoning steps to reach a solution. These general methods are referred to as weak methods, because they use weak information about the domain. Newell & Simon argue that these general problem solving methods enable the program to solve in principle any problem. Although for many complex domains it turns out that their performance is also weak.

In 1958 McCarthy defined Lisp (MIT AI Lab Memo No. 1). Lisp is the dominant AI programming language up to this day.
2.2.2.2 Domain specific problem solvers

To improve performance it is necessary to use knowledge more suited to make large reasoning steps and to solving typically occurring problems in narrow areas of expertise. The DENDRAL program was one of the first programs using this approach (Buchanan, Sutherland & Feigenbaum, 1969). It effectively used domain specific knowledge to achieve expert level problem solving performance. DENDRAL could solve the problem of inferring molecular structure from the information provided by a mass spectrometer. However, the methodology of expert systems was established in MYCIN developed in the mid-1970s (see, for instance, Buchanan & Shortliffe, 1984). Many of the expert systems development techniques were first developed in the MYCIN project. MYCIN uses expert medical knowledge to diagnose and prescribe treatment for spinal meningitis and bacterial infections of the blood. MYCIN provided clear and logical explanations of the reasoning, used a control structure appropriate to the specific problem domain and identified criteria to reliably evaluate its performance.

One of the major insights gained from this later work in problem solving was the importance of domain specific knowledge. A lawyer, for example, is not effective at solving a legal case because she possesses some general problem solving skill; she is effective because she knows a lot about law. The construction of expert systems involved obtaining the knowledge from a human expert and coding it in the form that a computer may apply to similar problems. Expert systems are based on a model of the human expert. An important task in constructing expert systems is investigating the knowledge of the human expert. The first impression is that experts use a large collection of rules, together with other structures defining objects and properties that participate in the rules. Consequently expert system developers focus on the extraction and implementation of these rules. Although many expert systems developed this way produced interesting problem solving performance, there were major deficiencies. There was a lack of basic functions as explanation. This was in part found by research in the field of intelligent tutoring systems (ITS). This shortcoming resulted from a lack of distinguishing knowledge on the basis of their role in problem solving and a lack of availability of ‘deep’ knowledge.
2.2.2.3 Domain specific model based problem solvers

Clancey (1979) was one of the first researchers who started looking 'behind the rules'. His research was motivated by the construction of educational tools based on expert systems. The MYCIN rule base appeared too weak to be used for teaching situations. He showed that the rules in MYCIN's knowledge base have different roles in problem solving.

Take for example the following MYCIN rule:

IF
(1) the infection is meningitis AND
(2) the subtype of meningitis is bacterial AND
(3) only circumstantial evidence is available AND
(4) the patient is at least 17 years old AND
(5) the patient is an alcoholic

THEN
there is suggestive evidence that diplococuss-pneumoniae is an organism causing the meningitis.

Clancey noticed that hidden in the rule is a top down refinement strategy: Is there an infection? Is it meningitis? Is the infection bacterial? Is it diplococuss-pneumoniae?

This strategy is not explicitly represented, where the supporting knowledge, as diplococuss-pneumoniae is an organism related to bacterial meningitis, is also not represented. A second strategy hidden in the rule is to eliminate hypotheses based on easily accessible evidence. In the example rule, children are not alcoholic, so clause 4 acts as a screening rule for the alcoholism test. However, MYCIN does not have an explicit representation about the relation between age and alcoholism, it also does not have an explicit representation of the screening strategy.

The rules found in expert systems can be identified as compiled knowledge, hidden are the strategies and the structure of the domain knowledge referred to as 'deep' knowledge, part of the domain knowledge is transformed according to a particular strategy into a rule. Both the top down refinement strategy and the screening strategy are examples of problem solving methods, where a disease hierarchy is part of the domain knowledge (see Fig. 2.1).
The disease hierarchy presents a part of the domain knowledge. Meningitis is classified as an infection, where other types of infection are bacteremia, cystitis and brain abscess. There are two specific types of meningitis, acute and chronic, where acute meningitis can either be viral or bacterial etc. Clancey also abstracted the problem solving method from MYCIN and called it heuristic classification (see Fig. 2.2).

The availability of explicit problem solving methods and domain knowledge structures is beneficial for teaching and may also provide better explanations. The insights had also consequences for the construction of artificial problem solvers.
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The KADS methodology developed a set of models for interpreting the problem solving behavior of experts, the basic objective being the identification of the problem solving methods and domain structures used in problem solving (see, for instance, Breuker & Wielinga, 1985; Breuker & Wielinga, 1989).

To be able to use the expert systems as a basis for teaching and to be able to provide adequate explanations, the system should know something about the rationale behind the rules. Although expertise may be characterized by reasoning short cuts and empirical associations (i.e. largely heuristic knowledge), for explainable and justifiable reasoning, as e.g. required in teaching, one has to make explicit in the representation of the knowledge which types of knowledge play which role in solving problems in a particular domain. This calls in the first place for a clear distinction of the domain knowledge and the problem solving knowledge, and within the domain knowledge of the kinds of knowledge that play roles in ("are used by") the reasoning knowledge. Therefore the idea of separating the representation of domain knowledge and the problem solving behavior (task) in representing problem solving was introduced. The separation of domain knowledge and task implies that there can be separated structured models to represent the domain and the task. An explicit and separated representation enables reasoning from these models (deep knowledge) improving the explanatory power. The separation between a model of the domain knowledge and the task to be performed also improves the re-usability of these models. Systems based on the separation are also easier to maintain. The knowledge structures, which represent aspects of the domain, are more natural as a representation of the problem than the surface heuristic rules. It was Newell (1982) who proposed to shift the attention in AI from a symbol level representation to a knowledge level representation.

The knowledge level "serves as a specification of what a system should be able to do" independent of the specific representation technology or formalism which is used to transform this specification into a computer system (symbol level). This has the practical advantage that there is no immediate commitment to a particular implementation platform and the actual implementation can be performed later on.

The knowledge level representation makes it possible to study problem solving in abstract terms both from the side of the content of the knowledge needed in solving the problems as from the side of the way in which the knowledge has to be used.
These conceptualizations of problem solving are supposed to resemble the mental models of problem solving in the world more than the symbol representation vocabulary does. To summarize the contributions of artificial problem solving research important for studying problem solving:

- separate the representation of domain and task
- use explicit models of domain and task
- develop these models on the knowledge level

In developing these explicit models of problem solving there are basically three paths available (Valente, 1995) (see Fig. 2.3).

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Figure 2.3: Paths in developing models of problem solving (with permission Valente, 1995).

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5 Knowledge level languages have been constructed to be able to communicate about the knowledge level. CommonKADS is an example of such a knowledge level vocabulary (see, for instance, Breuker & Van de Velde, 1994).
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The first is elaborating models of general types of tasks where developing models of legal tasks consists of identifying typical problems in law and develop task models to solve these problems (top down). The second is finding models of domains using an ontology as the basis for describing the knowledge in the domain in general and the domain models in particular (bottom up). A third path is to develop problem solving methods, i.e. coupled models of task and domain (middle out).

Another major contribution of artificial intelligence is that it uses parsimonious descriptions of problem solving methods. Instead of describing a method as a series of steps or course of action based on more or less accidental observations, as is common in psychology, a method is described as a coherent structure.

2.2.2.4 Recapitulation

We reviewed research on human and artificial problem solving introducing their basic problem solving terminology. However, to be able to find out the role of both the problem solving method and the domain knowledge in legal case solving we need to describe in more detail the components that can be distinguished in the problem solving process.

Our review revealed two of the basic ingredients in the problem solving process; the problem solving method (PSM) and the domain knowledge.

However, there is yet a third ingredient, being the case model or situation model (Steels, 1992). Artificial intelligence theories assume that the problem to be solved is presented in such a form that the problem solver understands what is going on. Therefore a model of the situation is presupposed. Two types of models are distinguished being dynamic models, where a situation may change on the basis of actions of agents, and static models.

Understanding the incomplete situation description results in the construction of a partial model of the problem situation. To solve a problem, that is being confronted with an incomplete situation description, is in fact no more than to complete the situation model. However, to be able to construct and complete a situation or case model requires knowledge regarding the problem situation. When it concerns common problems common sense knowledge can be used to construct the situation model.
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However, when, for instance, it concerns physics problems the problem solver must really know what the problem is to be able to solve it. To be able to know what the problem is she should be able to recognize objects in the situation description on the basis of her knowledge about physics. When the problem situation describes a bicycle tire and bicycle pump she should be able to recognize these objects as being canonical objects (a balloon and a piston) in thermodynamics. We depict the problem solving components in Fig. 2.4.

![Diagram](image)

**Figure 2.4: Problem solving components.**

Problem solving actually involves two major steps. The first step in the process of solving a problem is the recognition of the problem situation (incomplete case model), where the second step is solving the problem using related problem solving methods, as diagnosis, design or assessment, that infer and justify aspects in the problem situation and complete the case model. The case model together with the goal contains the problem, the problem statement. It is possible to make a typology of problem statements and in turn relate the problem type to a problem solving method that can be applied to solving a problem, that is to construct a complete case model.
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In human problem solving research the emphasis has always been more on problem solving method, where artificial intelligence has showed that domain knowledge plays a major role in domain specific problem solving both in the construction of the case model as in the actual problem solving process\textsuperscript{6}.

2.2.3 Problem and Problem Solving Method

The terminology in describing problem solving often gives rise to confusion. Terms as task, problem and problem solving method are used, sometimes these terms refer to the same elements in problem solving, sometimes they each refer to different elements. We therefore briefly discuss the terms we use in problem solving and their interrelation to make clear what they refer to.

\textsuperscript{6} The distinction between competence and performance as used in linguistics and first introduced by Chomsky (1956), can be used to indicate the fundamental difference between the way artificial intelligence depicts problem solving methods as compared to psychology. Where in linguistics competence refers to the phenomenon of language without relating to either man or machine, performance refers to the way in which language is used. In the view of Clancey the method should be looked upon as the core of the competence of task performance, so it depicts the way in which the task should be performed. Instead of describing the method as a sequence of steps, the method is described as a coherent inference structure that depicts the decomposition inherent in this kind of tasks. An important issue is also that when competence is made explicit one knows how performance can be enhanced on the basis of it.
2.2.3.1 Problem

In problem solving we are confronted with a problem we want to solve. In the approach of Newell & Simon (1972) a problem is conceived as a conflict between an initial state and a goal state. They describe a problem as follows:

A person is confronted with a problem when he wants something and does not know immediately what series of actions he can perform to get it. The desired object may be very tangible (an apple to eat) or abstract (an elegant proof for a theorem). It may be specific (that particular apple over there) or quite general (something to appease hunger). It may be a physical object (an apple) or a set of symbols (the proof of a theorem). The actions involved in obtaining desired objects include physical actions (walking, reaching, writing), perceptual activities (looking, listening), and purely mental activities (judging the similarity of two symbols, remembering a scene and so on) (Newell & Simon, 1972, p. 72).

In their research Newell & Simon focused on well defined problems, being problems that are characterized by their problem space. A problem is well defined when there is a simple test to conclude that a solution is a solution, being a complete match of problem space and solution. However, this description is somewhat incomplete given the way we identify problems in everyday life. Let us revisit the situation description in Chapter 1, the Elhag case. In his situation his goal is to do his work properly. Elhag assumes that this involves, at least, having a telephone connection. However, this assumption is violated when he finds out that there is no such connection. Breuker (1994) therefore assumes that it is more appropriate to use the terms norm state and actual state instead of initial state and goal state. Because the identification of a discrepancy between the actual state and the norm state does not indicate in which direction a solution should be found, it leaves us with an ill defined problem. So Elhag is confronted with an actual state, e.g. he cannot do his work properly, that does not match his norm state, e.g. he wants to do his work properly, he has a problem. However, it is possible to think of a variety of solutions to his problem. For example, he may quit his job, he may choose to install a connection himself, he may decide to make his phone calls in a nearby office or he may choose to try to get a connection. It is obvious that what he is going to do about his problem depends on what solution he opts for.
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The intended solution defines the type of problem, whereas the type of problem indicates what problem solving methods are appropriate to use in solving the problem. Solving a problem involves a problem that can be solved, a task that is executed and methods that solve the problem. Where for a problem the methods to solve the problem still have to be found, a task contains problem solving methods for its execution. Instead of using typologies of tasks to find a task that can be executed Breuker (1994) suggests to construct a typology of problems to be able to find a task that may apply the appropriate problem solving methods. Breuker states that to be able to type problems it is necessary to look at what constitutes the solution to the problem. A solution is proposed to have three components (1) a case model, being a description of the level of understanding of the problem; (2) the argument structure, being the justification of the conclusion; (3) the conclusion, being the answer to the question posed by the problem (see Fig. 2.5).

Take, again, the Elhag case. The conclusion is the answer to the question posed. The question was “What can Mr. Elhag do given the situation?” so the conclusion is “Mr. Elhag can make an objection.”
The argument structure is the part that presents the reasons that justify this conclusion, where the case model represents a conceptualization of the problem\(^7\). The conclusion has the role of the main result, the case model has the role of explaining the problem data, the argument structure has the role of justifying the conclusion. Problems, according to Breuker, can be characterized by their generic conclusions. A generic conclusion is an abstract description of an object that covers the set of conclusions. Breuker organizes the problem types not in a taxonomy but in a suite. Such a suite shows dependencies of availability of knowledge between types of problems. When the knowledge to solve a problem is not fully available, another problem may be set up to produce this knowledge.

### 2.2.3.2 Problem solving method

When the problem is typed the task to be executed for solving the problem can be selected and executed. A task contains a plan, i.e. problem solving methods, for the execution of the task. A problem solving method specifies how a task can be decomposed into subtasks, how the execution of these subtasks is to be controlled and which requirements are imposed on the representation of the domain knowledge in order for the method to work. The outcome of a task decomposition is a task structure. The task structure also justifies the method, that is, it indicates why a certain outcome can be achieved using the method (Breuker & Van de Velde, 1994; Breuker, 1997). To illustrate this we use the task of diagnosis as an example. Benjamins (1993, p. 2) describes diagnosis as “the task of identifying the cause of a fault that manifests itself through some observed behavior.” The prime diagnostic method decomposes the task into three subtasks: symptom detection, hypothesis generation and hypothesis discrimination (see Fig. 2.6).

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\(^7\) A complete case model is the solution.
Symptom detection is concerned with finding out if the observed behavior, the complaint, is a deviation from what might be expected.
Hypothesis generation is concerned with generating possible causes for the deviation taking into account the initial observations. Hypothesis discrimination is discriminating between the generated hypothesis based on additional observations. Each of these subtasks can be analyzed further to reveal problem solving methods that may realize them. A possible method for detecting symptoms is to compare expected values to observed values, another possible method is to classify an initial observation as normal or abnormal and finally a method for finding out whether the initial observation is abnormal or normal is to ask the user. The subtask symptom detection can therefore be decomposed using one of the following methods: the problem solving method compare symptom detection or the problem solving method classify symptom detection or ask-user symptom detection.

Take, for instance, the situation that you want to drive your car, however you find out that it does not start. You want to know what caused it. You execute the task of diagnosis by starting to detect the symptom. You use the classify symptom detection method in classifying the initial observation as abnormal. Finding the discrepancies between the norm state, a properly functioning car, and the actual state, a non functioning car, is what Breuker (1994) refers to as a monitoring problem, that is you detect a deviation, where finding a cause for the deviation is referred to as diagnosis (Breuker, 1994). Normally the car does start. This brings you to the hypothesis generation subtask that will generate hypotheses that explain the initial observation that was classified as abnormal. That the car does not start can be explained by the hypothesis that there is a dead battery, or by the hypothesis that there is no petrol in the fuel tank, or by the hypothesis that the spark plugs are greasy, etc.. To be able to discriminate between the hypotheses additional observations are gathered in the hypothesis discrimination subtask.

You select the hypothesis that the battery is dead. To be able to discard this hypothesis you collect additional data. You select the compiled test, which means that you collect these data by performing a test. If the headlights can be switched on this means that the battery is not flat. The actual measurement, the test, then has to be carried out. You switch on the headlights. The headlights can not be turned on. This will bring you to the subtask of interpreting the data. The fact that the headlights can not be turned on matches your expectation that the battery is dead. The hypothesis that the car does not start because of a dead battery is confirmed.
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The problem solving methods are described in abstract and general terms. This makes them applicable in a variety of domains where diagnosis can be executed. So the same problem solving methods apply when you want to find out why your bike is making such a strange noise.

2.2.3.3 Interaction hypothesis

One of the major contributions of artificial intelligence to problem solving research was the separation of the basic components in the problem solving process being domain knowledge and problem solving method. However, Chandrasekaran (1987) was the first to recognize that although these components are and should be separated, there is a close interaction between them. This is referred to as ‘the interaction hypothesis’. For example, the task of diagnosis is to find faulty components in a system. The faulty component could be, for example, a bug in a computer program, a malfunctioning component in your video recorder or a defect in your body, relating to systems as respectively, a computer program, a video recorder and the human body. The problem is to find and repair the faulty component(s).

Although diagnosis is a task that can be performed in a variety of domains to solve diagnostic problems, diagnosis is not a problem solving method used in every domain. There is no such thing as diagnosis in the legal domain, the content and structure of the knowledge in the legal domain is not suitable to perform diagnosis. The same is the case with the planning task. There are a variety of domains in which planning problems may arise. For example, you may want to plan a trip or as a lawyer you may want to plan your clients case outcome. However, you do not plan a machine, you design it. So to be able to find a suitable problem solving method it is inevitable to analyze the problem solving task from two different points of view. The task should be analyzed from the point of view of the problem solving method to be applied to perform the task, that is to reach the goal and solve the problem. However, the task should also be analyzed from the point of view of the domain knowledge. As is depicted in Fig. 2.3, the two should be analyzed in interaction within an iterative process. Therefore it is inevitable to analyze legal case solving both from the point of view of the domain knowledge and from the point of view of the problem solving method. We will continue the analysis of legal case solving from the viewpoint of the problem solving method in paragraph 2.3. The domain knowledge viewpoint in turn is described in Chapter 3.
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To be able to answer the question what the task of legal case solving implies we have to conceptualize the task of legal case solving. We already indicated that problem solving involves two steps: (1) recognition of the problem situation and (2) solving the problem. These steps also apply in legal case solving. In solving a legal case the recognition of the problem situation involves two types of interpretation. First the situation has to be interpreted from a common sense point of view, for example, you have to understand that someone is furious. Second the situation has to be interpreted from the legal point of view. This legal perspective makes that only some aspects in the case are relevant. This legal perspective demands that the case solver is able to recognize aspects in the problem situation that refer to typical objects in the legal domain. This requires knowledge of the domain. To be able to solve the problem it is necessary to apply the proper problem solving method, where the problem solving method closely interacts with the domain knowledge. In analyzing the task of legal case solving to be able to find out what it takes to solve legal cases, it is therefore necessary to examine legal case solving both from the point of view of the domain knowledge and to examine the problem solving method from a legal perspective. The analysis of the domain knowledge is the subject of Chapter 3. Here we continue with examining the problem solving method from a legal perspective. Therefore we start with consulting available sources for their viewpoint on legal case solving. The following sources were consulted:

- Empirical research
- Educational practice
- Theoretical research
- Artificial Intelligence & Law research

Empirical research on legal case solving behavior is discussed first, followed by a discussion of legal case solving methods used in educational practice. Legal practitioners also reflect on their activities being a potential source for a problem solving method. The last source that is used to find a problem solving method for solving legal cases is research in the field of Artificial Intelligence & Law.
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The approaches show different viewpoints and have different objectives. If the methods vary with each approach the conclusion must be that there is something wrong with either the experts or the theorists. However, if the methods are more or less the same this can be used, together with the information from the protocols, to formulate a problem solving method that may be used in the design of the instructional environment.

2.3.1 Empirical Research

As we indicated in Chapter 1, legal case solving is the key activity of legal practitioners and legal researchers. This being so it may seem obvious that it also has been the subject of empirical research. However, real empirical research on legal case solving is rather rare. This may be caused by the fact that the legal discipline has no real empirical research tradition. Another complication is that the Anglo American legal system differs from the continental legal system. Therefore findings on solving legal cases reported by American and English researchers cannot be used directly, because the focus in the task of solving the problem differs fundamentally (see, for instance, Teich, 1986; Tunkel, 1992; Muntjewerff, 1994a). In the series of experiments performed by Crombag and his colleagues (see also Chapter 1) legal experts were observed and questioned during legal case solving. Although the research is classified here as empirical, the research more or less mingles empirical and constructional research. This is caused by the fact that the motivation for carrying out the study was to improve students’ legal case solving skills. The research was carried out following the observation that students were poor legal case solvers and that this was caused by a lack of a method for legal case solving. Therefore a method of legal case solving was reconstructed on the basis of interviews, observations and notes of the subjects recording their own thinking.

8 There is, for example, empirical research on how public prosecutors determine the sentence in a specific case (see, for instance, Enschede, 1975; van Duyne, 1983; Oskamp, 1998). However, the focus in these studies was not on how they performed the task of legal case solving, but more on what aspects are important in determining type and size of the sentence. Enschede presented public prosecutors with a specific problem situation (famous became the Barend case) and asked them what sentence they would think suitable. Enschede found support for his hypothesis that there are unaccounted, unwarranted and therefore unacceptable differences in sentencing.
The subjects were law teachers and experienced legal practitioners. In the 1971 project the researchers asked themselves how they could find a method for legal case solving. The first they did was to go and ask the teachers, because they are experienced legal case solvers. The assumption was that they would know what to do to solve a legal case. However, the results of this survey were rather disappointing. Teachers either stated that it is an art, or they confined some unsystematic and vague advice. Therefore the researchers decided to have legal experts solve legal cases while thinking aloud. They expected that this would reveal a system. However, the protocols made a rather chaotic and unsystematic impression. Therefore they decided to solve a legal case while placing themselves in the position of a beginning student. The first studies date back to 1970. Several refinement studies were made during the period 1970 - 1977. The more elaborate description of a method for legal case solving contains a detailed description of the activities together with procedures of control (see Crombag et al. 1977). However, the researchers acknowledge that the method has become too complicated to instruct directly to the student. Therefore they present their elaborate description as a psychological theory of judicial decision making. The method for solving legal cases that resulted from the rational reconstruction of the legal case solving process of law teachers and legal practitioners basically consists of the following activities (see Fig. 2.7).

Figure 2.7: Legal case solving I. Rectangles represent methods and ellipses represent tasks.
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Right from the start the focus of the research presented here has been on constructing a method for instructing legal case solving. The methods resulting from the research were immediately adapted and adopted for educational practice.

2.3.2 Educational Practice

The same we said about the empirical research applies for educational practice. The Dutch legal discipline has no real educational research tradition. The Anglo American educational research findings and materials cannot be used without major adaptations because of the fundamental differences between the Anglo American and the continental legal systems. The methods for legal case solving used in educational practice are based, entirely or partially, on the research carried out by Crombag and his colleagues.

Although the method presented by Franken (1991) is based on his own theory on judicial construction (Franken, 1987) there is also a close relation with the research by Crombag and his colleagues. The methods used in legal education to facilitate the acquisition and the understanding of legal case solving are described in Giltay Veth (1974), Abas, (1985); Abas, Broekers-Knol, van Hasselt-Pino & van Loenhoud-de Wolf (1985), Henket & van den Hoven (1990); Franken (1991), Algra et al. (1991), Wessels (1985, 1992).

The focus is on instructing novices. Abas et al. (1985) present a method for legal case solving that is entirely based on the method of Crombag and his colleagues. Henket & van den Hoven (1990) describe a step by step approach of legal case solving from a legal argumentation perspective. The main issue in legal case solving, according to Henket et al. (1990), is to defend a certain position in a legal argument with regard to a legal question related to a specific case. To be able to solve a legal case the facts that are legally relevant have to be selected to be able to apply the relevant rules of law to these facts. However, this is a problem, because legally relevant facts are facts to which applicable rules of law connect legal consequences. And applicable rules of law in turn are those rules of law that connect a legal consequence to the facts in the case. Facts have to be assessed on the basis of the rules of law, however, at the same time the applicable rules of law have to be found on the basis of the facts in the case.
Two argumentation steps are distinguished. The first is the legal qualification of the facts, that is the translation or description of the case facts in terms of the rules of law. The second step is connecting consequences to the legal qualification. Henket & van den Hoven (1990) claim that they introduce a new aspect in the method for legal case solving, being argumentation. However, what they claim to be argumentation is not argumentation in the strict sense, but reasoning. They refer to the fact that some facts in the case match or do not match to an article component. This type of argumentation, being reasoning, is present in all legal case solving methods\(^9\).

The legal case solving method described by Algra (1991) states that after formulating the question the next step should be the search for and selection of applicable rules of law. On the basis of these rules of law the case terms should be translated into legal terms as used in the applicable rules of law. However, to be able to locate these applicable rules of law the case terms should be classified into legal terms first to be able to search for and select the applicable rules. The case terms must be translated into legal terms to transform the case into a legal case. The legal case solving model presented in Wessels (1992) refers to the work by Abas et al. (1985), Franken (1991) and Cohen (1992).

2.3.2.1 Comparison

All methods prescribe explicitly to the student what steps to take in solving a legal case. It may not come as a surprise that all these methods used in educational practice are more or less identical. This is caused by the fact that they take the same model as their basis. The methods in educational practice however, do reveal the problem of facts and legal rules that need to be selected in interdependence. The legal case solving task is decomposed in the following subtasks (see Fig. 2.8).

\(^9\) Note that Breuker (1994) also sets argumentation as a major component in reasoning.
When compared to the activities distinguished on the basis of the empirical research, there are no major differences. This is also not surprising, because all educational methods are based on this empirical research. The only point may be that in educational practice there is no opportunity to instruct all aspects in legal case solving. For instance, Abas et al. (1985) state that the emphasis in their instructional method is on the application of norms to facts, where only some attention is paid to the selection of relevant facts from a set of specific facts, and no attention is paid to the gathering of facts\textsuperscript{10}. To be able to determine if the correspondence on the method for legal case solving has a true basis we will turn to yet another source on legal case solving being theoretical research.

### 2.3.3 Theoretical Research

Legal practitioners also reflect on their activities: it is the origin of jurisprudence.

\textsuperscript{10} Bloemersen (1967), Drion (1977), Abas (1985), Fernhout \textit{et al.} (1988) emphasize the importance of these activities of fact gathering and fact proving in legal practice. They claim that in legal practice most of the time and effort is spent on these activities.
These reflections can be found in literature on judicial construction\textsuperscript{11} (see, for instance, Cardozo, 1921; Scholten, (1931) 1974; Polak, 1953; Wiarda, 1963; Esser, 1970; Franken, 1987; Pontier, 1988; Jue, 1990; de Lange, 1991; Bruggink, 1992) and literature on legal reasoning (see, for instance, MacCormick, 1978; Gijssels & van Hoecke, 1982; Golding, 1984, Wahlgren, 1992). The methods resulting from these reflections are descriptive when they state that this is the way legal practitioners work and prescriptive when they state that this is the way experts should work. The focus of these methods is on experts. The methods are not the outcome of empirical research and are neither empirically evaluated. Besides these reflections on the “how”, legal practitioners also reflect on the “what”, resulting in an extensive doctrine regarding the content of law (and, even more general, in jurisprudence and legal theory).

2.3.3.1 Judicial construction

Judicial construction or interpretation of rules of law is the activity where a legal practitioner tries to construct a legal solution for a specific situation. The term legal case solving is also used to refer to this activity. Franken (1991) describes the distinction between judicial construction and legal case solving as legal case solving being the activities of legal practitioners when solving a specific real life problem, where judicial construction is the theoretical view on these activities.

Scholten was the first to draw attention to the fact that it is very important for a legal practitioner, in his case a judge, to work in a systematic way. Such a systematic approach is beneficial both for detecting where the solution process halts, and for determining the content of the solution. It was again Scholten who explicitly made a distinction between rule application and judicial construction. Rule application is the term used when for a specific problem a rule of law is available and immediately applicable which results in a legal solution, where in the case of judicial construction there is no such immediate available rule of law. Judicial construction therefore involves the construction of such a rule of law by use of interpretation methods and reasoning techniques to “find” a solution for a specific problem within the legal system. Finding a legal solution means that the solution should be found within the system of law.

\textsuperscript{11} In Dutch: rechtsvinding.
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Scholten (1974) sees rule application as the process in which legal facts and rules of law are matched. The main tools for rule application are the rules of law. To be able to apply the rules to the specific problem situation an abstract situation description has to be constructed consisting of all relevant facts in terms of the selected applicable rules on the one hand (selected on the basis of the applicable rules) and a set of applicable rules on the other hand (selected and specified on the basis of the facts). Determining the legal facts and selecting the rules of law are carried out in interaction. The facts are determined as legal facts on the basis of the rules of law, while at the same time the rules are selected on the basis of the facts. However, there are also situations in which the rules of law are unclear or do not exist at all. Rules are not always immediately available within a regulation, but need to be constructed, as is the case, for instance, with open norms and conflicting regulations. That is what Scholten refers to as judicial construction. Before the rules can be applied to the abstracted situation, they first have to be constructed. In the rule construction part the existence of open norms and the situation that a set of (conflicting) rules may be applicable at the same time, are handled. For the construction of the rules Scholten (1974) describes a series of rule construction methods, however, there is no order of priority within these interpretation methods, and reasoning techniques or forms of reasoning. Scholten (1974) distinguishes:

methods of interpretation
  grammatical interpretation
  systematic interpretation
  historical interpretation
  legal comparison and anticipating interpretation
  teleological interpretation

forms of reasoning\textsuperscript{12}
  reasoning by analogy
  a contrario reasoning
  refining a rule of law

\textsuperscript{12} In original: analogie redeneren, a contrario redeneren en rechtsverfijning (Scholten, 1974, p. 60).
Various authors have drawn attention to the fact that the primary task of a judge is to determine the facts (see, for instance, Abas, 1985). However, the relevant facts are selected in relation with the violated norms, where at the same time the violated norms are selected on the basis of the facts. The facts and rules of law should match. Deciding that certain facts are relevant is based upon the legal rules and at the same time the facts determine which rules are relevant for the case. According to Abas (1985) there are three situations possible. In the first situation there is a rule of law that can be applied without much difficulty. In the second case there is a rule of law, but it needs interpretation before it can be applied to the specific situation. Interpretation methods are used to explain the meaning of the existing rule of law. These interpretation methods are those of Scholten (1974). In the third situation there is no rule of law that can be applied immediately to this situation, the rule of law has to be (re)formulated. The judge can formulate a new rule of law using a reasoning method as reasoning by analogy, reasoning *a contrario* or refining a rule of law.

2.3.3.2 The legal solution

In Franken (1987) the nature and content of a legal solution is described in more detail. The description is based on a systematic analysis of decisions by judges. According to Franken the basis for each judicial decision ought to be a rule of law. Rules of law can be found in the legal sources being statutes and case law (precedents). Facts or events are relevant when a rule of law can be found that uses these facts to reach a conclusion. A judge formulates a specific conclusion on the basis of general, abstract rules of law and some specific facts. A judicial decision therefore contains a reasoning, more specific a deductive reasoning\(^\text{13}\). When both facts and rules of law do not pose problems of interpretation, the activity is rule application.

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\(^\text{13}\) Here Franken indicates what he sees as the content of a legal solution. A legal solution should contain a reasoning, which in turn contains a set of statements (a conclusion) that is supported by a series of other statements (the premises). A deductive reasoning contains at least one general premise and one specific conclusion. A specific type of deductive reasoning is the syllogism where there are no more than two premises. An inductive reasoning contains specific premises and a general conclusion.
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However, when the process involves an interpretation of the rules of law because the rules of law are not clear, or do not exist, the judge has to justify the interpretation process. The formulation of rules of law can be justified by calling for methods of interpretation, precedents and/or dogmatic. The selection of one or more of these techniques can be justified by calling for values and principles that are acknowledged within the law. Because the judicial decision is reached by considering alternatives, the choice for one of the alternatives has to be justified. A judicial decision should be legal and rational. It should therefore contain a reference to a rule of law, relate the specific facts to a rule of law and justify the reference to a certain rule of law using methods of interpretation, precedents and/or dogmatic in case a rule of law is not clear or can not be found.

The various theoretical sources all describe the same basic activities in the process of constructing a legal solution for a specific problem situation. Although their focus is mainly on judicial problem solving, they also agree that the same may account for other legal practitioners (see Fig. 2.9).

Figure 2.9: Legal case solving III. Rectangles represent methods and ellipses represent tasks.
When comparing the theoretical research viewpoint with the empirical and educational practice points of view we observe that the theoretical research point of view introduces more details into the legal case solving process. The theoretical viewpoint is more detailed where it:

- explicitly distinguishes between a factual and a legal part in the legal case solving process.
- explicitly describes the nature and content of the legal solution, or, as it is also called, the judicial decision.
- introduces a complication into the process of legal case solving, being the (re)interpretation of rules.

Judicial construction makes that solving a legal case not only involves the matching of the case to the legal rules, but also the (re)interpretation of the legal rules. When the legal rules do not fit the case, or when no legal rules are available, these legal rules are made to fit or are constructed. This involves a reinterpretation of the knowledge. This reinterpretation of the knowledge leads to an adjustment and even an extension of the domain knowledge.

### 2.3.3.3 Comparison

Comparing the descriptions resulting from the three different theoretical sources with the basic problem solving components shows that all sources describe legal case solving in terms of the various subtasks that together make out the task of legal case solving. The empirical research and the educational practice literature only describe subtasks, however, the theoretical research literature also describes the nature and content of a legal solution and introduces the issue of the (re)interpretation of the legal domain knowledge, being a (re)interpretation of the legal rules.

These details and the complication add subtasks that therefore also have consequences for the structure and content of the problem solving method. The overview thus far resulted in the identification of the tasks and subtasks in solving a legal case. It is a positive outcome to conclude that the different sources agree on the main activities in legal case solving. They all basically come down to the same lists of prescriptions. However, the overview also leaves us with the following problem. How can we actually solve a legal case using these prescriptions? For example, how do we actually carry out the activity ‘select relevant facts’?
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How can one possibly determine which facts to select? On the basis of which criteria does one know what facts are relevant or not? Does one have to go through all regulations and try to match each individual norm to each individual fact? It is obvious that this is an impossible activity to perform for a human. How would we have a machine carry out this task? Having the machine selecting all regulations, match each rule to each fact is no problem for the machine as far as memory is concerned. However, it will lead to a combinatorial explosion within no time. One therefore also need rules, or at least heuristics, that tell one how to find the relevant facts. To be able to determine which facts in the legal case are relevant or not one has to know what world it refers to, what world therefore is applicable. This requires some global ideas about the principles and objectives of a regulation. Within a regulation the actual meaning is wrapped around the basic concepts and the structure of the regulation. We are therefore confronted with the problem that although there is agreement on the activities, performing the legal case solving task is not that self evident. This is partially due to the fact that these prescriptions depict the performance, rather than the competence. Therefore we revisit research on artificial intelligence, however, this time with a focus on law, to find out how we may arrive at a problem solving method for solving legal cases that acknowledges the role of the domain knowledge and depicts competence rather than performance.

2.3.4 Research in Artificial Intelligence & Law

Artificial intelligence (AI) methods are also a source to arrive at an explicit method for legal case solving (see, for instance, Valente, 1995; den Haan, 1996). In reflecting on their activities legal practitioners aim at methods that guarantee efficiency and effectiveness. AI research aims at efficiency and effectiveness even more than prescriptions that address humans. The advantage of the use of AI methods is that these methods have to be executed by machines requiring explicit methods and knowledge. The object of research in computer science and law is to study the activities of legal practitioners using methods and techniques from computer science. Research in the field of AI & Law is concerned with the study of legal problem solving from the perspective of generating legal problem solving by systems other than humans. The emphasis in research in AI & Law is on constructing theories and models for legal problem solving which can be generated by a computer. The
focus is on automated legal problem solving. The discipline of AI & Law uses methods and techniques from artificial intelligence to study the activities of legal practitioners. Legal reasoning is studied in relation with a particular legal task by automating the legal reasoning process for this task.

In our paragraph on artificial problem solving (paragraph 2.2.2) the contributions of artificial problem solving research to studying problem solving were described. These contributions are the separation of the representation of domain knowledge and task, the use of explicit models of domain and task, and developing these models on the knowledge level, also referred to as the model based approach. Sergot (1991) presents an overview of research on the representation of law in computer programs. Because of the significance of an explicit problem solving method and articulate domain knowledge most of the research projects described by Sergot are not very interesting for our purpose because these projects can be classified as 'pre Clancey'. The model based approach is the most articulate and structured approach resulting in a well funded problem solving method for solving legal cases. The legal equivalent of the ‘post Clancey’ or model based approach, is the model based legal knowledge engineering approach (see, for instance, Valente, 1995; den Haan, 1996; den Haan & Sartor, 1999).

2.3.4.1 The model based approach

Model based legal knowledge engineering deals with modeling legal problem solving methods and modeling legal domain knowledge. The model based approach involves the construction of a set of models of problem solving behavior where a system is a computational realization of these models (see, for instance, Breuker & Van de Velde, 1994; Valente, 1995, den Haan, 1996). The models serve as a specification of what a system should be able to do, that is, they are specified on the knowledge level. The abstract character of this level also required special specification languages to be able to express the models and to communicate them. An example of such a language is presented in CommonKADS (Breuker & Van de Velde, 1994). In the CommonKADS Library problem solving is described in terms of a set modeling components. The Library also contains a set of prototypical models for major tasks.

Within the model based legal knowledge engineering approach the emphasis at the moment seems to be more on legal knowledge (see, for instance, den Haan & Sartor, 1999).
Legal knowledge engineering has to deal with the complexity of modelling the world around us, modelling the normative modalities as defined in law texts, and translating the legal procedures into legal knowledge-based systems that yield the same correct, clear, unambiguous results that humans would deliver (den Haan & Sartor, 1999, p. 1037).

The emphasis is shifted from problem solving methods to the domain knowledge in search for structures that underlie the content of legal knowledge resulting in legal ontologies. Although this is very important, what we need is an integrated and explicit description of both the problem solving method and the legal knowledge. The only research that has this double focus is presented by Valente (1995) and Valente, Breuker & Brouwer (1999). Therefore within the model based approach we opt for this approach which describes the construction of a model of automated legal reasoning.

2.3.4.2 Legal assessment

Legal case solving has been described so far as the construction of a legal solution for a specific problem situation using legal rules as the problem solving devices. The specific facts in the legal case should match the abstract legal rules. In terms of Breuker’s suite of problem types this is an assessment problem. The assessment problem involves the use of a measurement of some characteristic of a system to classify behavior. The corresponding task in the CommonKADS Library is assessment. A law specific model for assessment was developed on the basis of the prototypical models available in the CommonKADS Library (Valente & Löckenhoff, 1993; Valente, 1995). This resulted in the legal assessment model. Legal assessment consists of assessing a certain case on the basis of a certain body of law to verify whether or not it complies with the law (see Fig. 2.10).
Figure 2.10: Legal assessment. The ellipses indicate subtasks. The rectangles indicate subtask input and output (dynamic and static roles). The arrow links indicate the direction of the flow of knowledge.
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The model shows how the task is decomposed in subtasks and how the subtasks are connected. Two main parts can be distinguished in legal assessment, being classifying assessment and normative assessment. Classifying assessment involves the subtasks structure case and abstract case. Normative assessment involves the subtasks match case and resolve conflicts. The initial case description is structured by eliminating irrelevant information or connecting information that goes together. However, to be able to decide what is relevant or not in a case description requires knowledge about the world the case description refers to. The same applies for the second subtask abstract case. The more specific terms used in the case are translated in the more abstract terms used in the legal rules. This requires knowledge of the abstract legal terms used in the world the case refers to. The abstract case description that is the outcome of these subtasks is now compared with a set of norms (a standard) to see which norms match the abstract case terms. This requires the availability of these norms. The outcome is a set of violations that in turn may yield conflicting results. Resolving the conflicts requires knowledge about priorities. The decision finally indicates the assertion of a final status, being either ‘allowed’ or ‘disallowed’.

2.3.4.3 Comparison

Comparing the descriptions resulting from the three different legal theoretical sources with the legal assessment model shows basic agreement on the various subtasks. The distinction between the factual and the legal construction part is also present in the legal assessment model where a distinction is made between common sense reasoning which is the identification of category membership, that is the identification of an instance as a legal term, and legal reasoning in a strict sense, that is applying legal rules. However, the legal assessment model also explicitly refers to the legal knowledge, where different types of knowledge are distinguished based on their role in the legal case solving process. This structure in the legal knowledge is discussed in more detail in Chapter 3.
2.3.5 To Sum Up

The different sources that were consulted vary both in their viewpoint, objectives and terminology\textsuperscript{14}. However, the series of activities that result from these approaches do not differ much. There is considerable consensus on the legal case solving task.

The core of legal case solving consists of applying abstract legal rules to a specific situation. This is part of the activities of a judge who has to decide in a situation where two or more conflicting parties are involved. It is part of the activities of a lawyer who prepares her case for her client for the judge to decide upon. It is part of the activities of legal practitioners who decide upon requests by people. It is part of the activities of legal practitioners who give legal advice to people. Whether or not an elaborate and specific argumentation is part of legal case solving depends on the specific activity. However, a justification of the formulated solution is always required. This justification consists of a description of the inputs and outputs of the successive steps taken in the problem solving process.

All models described so far explicitly state the subtasks. Although references are made to what sources of data and knowledge are to be used (input) when performing a specific activity and what the outcome is of each successive step (output), the content and the structure of these sources remain implicit within the first three sources. Only the model based approach of Valente (1995) explicitly incorporates the (type of) knowledge needed. Combining the different models so far resulted in the following legal case solving model (see Fig. 2.11).

\textsuperscript{14} Legal case solving, judicial construction, legal reasoning, legal assessment.
However, whatever the method, applying the method is not a matter of an exhaustive search of all legal rules where all facts are matched to all legal rules.
Although this problem has also not yet been solved in artificial intelligence and law, at least the problem is acknowledged. It is assumed that there are intermediate objects that guide the search process. These objects are the basic domain concepts and the structure in the knowledge. Solving a legal case shows an interaction between the problem solving method and the domain knowledge. The trade off of this method - content interaction is that the more we are focusing on the method the more content is needed to be able to perform the method. It appears that without the content the method cannot be performed. The domain knowledge will be discussed in more detail in Chapter 3. Here we conclude that the task structure of legal case solving has become more or less clear.

We are also interested in how novices and experts actually solve legal cases. We want to verify if students are unsystematic legal case solvers and, if so, why this is the case. We hypothesized that difficulties in legal case solving are first of all caused by insufficient mastery of, or insight in, the subject matter. Therefore we carried out an empirical study on legal case solving behavior of novices and experts.

2.4 Solving Legal Cases

An empirical study was set out in which both law students (novices) and legal practitioners (experts) solve legal cases while thinking aloud. This study was carried out to examine how novices solve legal cases, what difficulties they experience and what the differences are between novices and experts with regard to solving legal cases. We want to find out if the observations by Crombag and his colleagues that novices work unsystematically while solving a legal case can be confirmed. Our hypothesis is that novices are apparent unsystematic legal case solvers. That is, it only looks as if they are working in an unsystematic way, however, on closer inspection they in fact use a system. The legal case solving model (see Fig. 2.11) presented in the previous paragraph is used as the interpretation model to see if novices use this model and if not if they are using any other system. We also want to find out what difficulties are experienced and what may account as causes. Our hypothesis is that difficulties in legal case solving are first of all caused by insufficient insight in, or mastery of, subject matter. We are also interested in the role of the method in legal case solving. Is a method the driving force behind legal case solving or does a method emerge from legal case solving?
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We first introduce the experimental design, and then we describe the approach for analyzing the protocols. This is followed by the presentation and discussion of the research findings.

2.4.1 Experimental Design

We wanted to find out how novices and experts solve legal cases. We therefore asked our subjects to solve two legal cases while thinking aloud. We start with a short introduction on the method employed followed by a description of the materials and the subjects involved.

2.4.1.1 The think aloud method

The method employed to explore novice and expert legal case solving behavior is to collect verbal data by asking novices and experts to work on a legal case and instruct them to ‘think aloud’, while everything they say is recorded. These recordings (protocols) are then transcribed and analyzed. This method is referred to as the think aloud method. This use of verbal data collected by introspection already has a successful history in the area of problem solving (see, for instance, Selz, 1922; de Groot, 1922; Newell & Simon, 1972; Elshout, 1976; Elshout-Mohr, 1976; Mettes & Pilot, 1980; Snoek, 1989).

There are two vital issues in gathering and analyzing verbal reports. The first issue relates to the (a priori) validity of self report data. The second issue relates to the need of an interpretation theory for analyzing the data. That introspection is not without problems is related to the fact that not all cognitive processes can be reported verbally, because, for instance, they occur very rapidly or because they are difficult to verbalize. This will lead to ‘gaps’ in the verbal reports. Therefore it has been suggested that the problems that may arise with introspection should on forehand be made explicit in the form of a model or “theory” about these phenomena (see, for example, Elshout, 1976; Ericsson & Simon, 1980; Breuker, 1981; Ericsson & Simon, 1984).
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The model of Ericsson & Simon intends to explain and predict under what conditions verbal report influence task performance, under what conditions verbal report is more or less complete and under what conditions verbal report is in accordance with other data collected from the same task performance (valid).

Our purpose in presenting a specific processing model is to aid us in interpreting verbal data obtained from subjects and the relation of their verbal to other behavior. Since the data (including the verbal data) are gathered to test theories about the human information processing system, we are engaged in something of a bootstrap operation. We need a model to interpret data that are to be used to test the model (Ericsson & Simon, 1980, p. 222, 223).

Breuker adopts this view, however he claims that the model of self report:

[...] should be conceived as part of the model that is used to interpret (analyse) the protocols (Breuker, 1981, p. 116).

We in turn will adopt Breuker’s approach. The verbal data (protocols) gathered should be described or explained on the basis of a theory or interpretation model. In order to analyze the protocols it is necessary to have already some ideas what to look for in the protocols, as protocols do not speak for themselves. Therefore the first step is to construct and formulate a theory to describe the categories and operations which may be relevant in performing the task. This theory is called an interpretation theory, because it is used to interpret statements in the protocols.

Then a model of self report can be described within the framework of the interpretation theory as suggested by Breuker (1981). Not all internal events can be verbalized all of the time, due to the fact that not all inner events can be observed by the performer and that although an event may be observed by the performer it may be hard to describe. Using verbal data in legal case solving is comparable with use of verbal data in other problem solving tasks (e.g. chess). These tasks are characterized by the fact that the categories and rules are a closed but not automated world. These reasoning tasks show relatively slow thinking and the processes are rather easy traceable.
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However, subjects have the impression that their minds are working at high speed.

The third step consists of the translation of the protocols in terms of the interpretation theory i.e. assigning formulas from the interpretation theory to the statements (coding). In analyzing protocols many things can go wrong. It may be that the interpretation categories are inadequate which will lead to a too superficial description of the cognitive processing, or the analysis may be too detailed. Protocols also contain statements that are not direct reflections of the task at hand. Irrelevant statements may not cause problems, however, incomplete statements will, because there may be statements that are multi-interpretable by providing insufficient context, or the experimenter may have been too anxious not to interfere with the self report to ask for clarifications. There may also be real gaps in the protocols, because the report goes slower than the actual processing. Gaps may be caused by forgetting (time between processing and report) or caused by intermediate processes that are not reportable, therefore protocols may have a too rational appearance.

We gathered our protocols by instructing the legal case solver to solve two legal cases while expressing everything they were thinking. These verbal protocols are used as the raw data gathered about the problem solving process. However, to be able to see the implications for theories on legal case solving these protocols need substantial interpretation and analysis.

To summarize the activities we had to carry out in the experiment:

- gather data
- select materials
- select subjects
- analyze data
- construct or formulate an interpretation theory
- describe model of self report
- code protocols (translate protocols in terms of interpretation theory)

To be able to gather the data we had to select the materials, being the legal cases to be solved by the subjects, and the subjects to solve these cases.
2.4.1.2 Materials

Two legal cases were presented to the subjects. Both cases are appropriate for the subjects to solve not being to easy or to difficult. Both cases are also good representatives of problems in law. The first case presented was an administrative law case (see Fig. 2.12). This was followed by the presentation of a civil law case (see Fig. 2.13).

The administrative law case is an example of a legal case used in educational practice\textsuperscript{15}. The legal case is taken from the administrative law course materials used by the Faculty of Law of the University of Amsterdam. According to the teachers the case is a typical example of an administrative law case of average difficulty.

\begin{quote}
Mayor and Aldermen of Maastricht decide by a written ruling dated 30 July 1981, to grant permission to the Bowl Corporation in Maastricht, under clause 56 of the Housing Act, to use the house at Looiersgracht number 12 as an office. This under the condition that the corporation makes the office at Looiersgracht number 8 which is in ownership of the Bowl Corporation suitable for residence (for one and two person households). The Provincial Corporation for Mental Health in Limburg keeping office at Looiersgracht number 8 is very much opposed to the decision of Mayor and Aldermen.

What actions can the Provincial Corporation for Mental Health in Limburg take and at which moment?
\end{quote}

Figure 2.12: The administrative law case.

The civil law case was taken from the research by Crombag and his colleagues. They used this case in their quest for a method.

\textsuperscript{15} At the time of the experiment there was no General Administrative Law Act (GALA) yet. The GALA became effective on 01-04-1994. The subjects had to apply the Administrative Justice Governmental Decisions Act. In Dutch: Wet Administrative rechtspraak overheidsbeschikkingen (Wet Arob).
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The case presents a typical civil law problem and is characterized as an easy case.\(^{16}\)

Rosa lends a valuable book to Kees. Because of a misunderstanding Kees assumes that Rosa gave him the book as a present. Some time later Kees gives the book to Jet as her birthday present. When Rosa visits Jet she discovers her book. Rosa asks Jet to give her back the book. However, Jet refuses because, as she tells Rosa, she got the book from a reliable friend who would never give away a book that did not belong to him. Rosa now wants to re-claim her book.

Is this possible? If so why and how? If not why not?

Figure 2.13: The civil law case.

2.4.1.3 Subjects

The subjects in the experiment were 26 law students (novices) and 4 legal practitioners (experts). The students all studied law at the Faculty of Law of the University of Amsterdam. The students were asked to volunteer in the experiment. The single requirement was that they already finished the course on administrative law. The legal practitioners all worked in the field of administrative law.

2.4.2 Running the Experiment

The experiment in which law students were asked to solve two legal cases while thinking aloud was carried out in two periods. The first period ran from 19 December 1990 - 11 February 1991, the second period from 22 October 1991 - 1 November 1991.

The four legal practitioner protocols were gathered on 28 March 1991, 23 April 1991, 3 February 1993 and 3 May 1993 respectively.

\(^{16}\) The subject is the third party in good faith. Span (1992) uses this domain in his legal coaching system, see for details Chapter 5. At the time of the experiment the applicable books of the Civil Code were not yet renewed. The new books 3 and 5 of the Civil Code became effective on 01-01-1992. However, one of the experts solved the civil law case on the basis of the new Civil Code.
2.4.2.1 Setting

Each student was invited to the Faculty of Law on a specific date and time to participate in the experiment. The room used was the instruction room of the department of Computer Science and Law. This room was located on a quiet spot in the faculty. The legal practitioners could either come to the Faculty of Law, or the experimenter would come to them, dependent on their preference. Two legal practitioners choose to come to the faculty, the other two were visited by the experimenter. After welcoming the subject the experimenter provided a short explanation about the purpose of the research, the course of the experiment and what was expected from the subject. It was also explained to the subject that the data were to be handled strictly confidential. The subject was provided paper and pencil in case she wanted to make notes.

2.4.2.2 Instructions

Both the novices and the experts were asked to bring their law books. After the introduction the experimenter presented the first legal case and asked the subject to solve this case and to say out loud everything that comes into mind (see Fig. 2.14).

![Instruction by the experimenter.](image)

You are going to solve two legal cases. This is the first case. You may use pen and paper, and you may use your law books. When you have finished the first case, I will give you the second one. You can take as long as you want to. It is important that you say out loud everything that comes into your mind while you are solving the case.

2.4.2.3 Role of the experimenter

The experimenter was present at each session. The role of the experimenter was a restrained one.

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17 In Dutch: wetboeken.
Chapter 2 Legal Case Solving

After the introduction and the instructions the only interference allowed were prompting a subject when she stops talking ("keep on talking"). In no way was the experimenter allowed to hint or correct the subject during the process of solving the case.

2.4.2.4 Recording

A tape recorder was used to record every utterance of both the subject and the experimenter during the session. The recordings started with the experimenter introducing and explaining the experiment and ended after the experimenter had thanked the subject for his or her participation. The resulting tapes were marked with the specific date and time. One of the tapes was damaged, leaving us with 25 recordings of novices.

2.4.2.5 Transcribing

All tapes were typed out completely and verbatim. The impasses, when no one was talking, were also registered using dots between brackets (........) and an indication of the period of time (n seconds). To avoid interpretation during transcription the tapes were typed out by others than the experimenter. The typist was instructed how to type out the tapes. We present a fragment of a verbatim novice protocol in which the administrative law case has to be solved as an example (see Fig. 2.15), where E = experimenter and N = novice, the novice refers to Mayor and Aldermen with the abbreviation M and A.
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N: M and A
(...........26 seconds)
yes, a decision of M and A then
(...........5 seconds)
so I will, I can, it was ....case take important elements out
it is about a decision
(...........5 seconds)
the Bowl Corporation
permission granted
so there is a decision
(...........)
and a decision on the basis of article 56 of the Housing Act
I also have to look that up also later on
(...........)
Is it allowed that I write on this?
E: Yes you may write on it.
N: (..........., sounds of writing, 10 seconds)
here something about a house.....an office
(........... 20 seconds)
first have a look if there are parties..
it is a matter of M and A who have taken a decision
and participate\(^\text{18}\) it to the Bowl Corporation
the decision has been taken on the basis of article 56 of the Housing Act
(...........7 seconds)
there are other parties
there are uh Provincial Corporation
they are al corporations eh?

Figure 2.15: Fragment of a verbatim novice protocol.

The transcripts of the novice protocols were ready at the end of 1991, the transcripts of the expert protocols were available in the middle of 1993. The transcribed protocols are the raw data that need to be analyzed. However, the analysis of the protocols took place in a much later stage of the research when the legal case solving model was available.

\(^{18}\) The student uses the term ‘participate’ where actually is meant ‘communicate’ (in Dutch deelnemen - meedelen).
2.4.3 Analyzing the Protocols

Analyzing the data involves the construction or formulation of an interpretation theory, the description of a model of self report and the coding of the protocols, which is a translation of the protocols in terms of the interpretation theory. Coding means assigning labels to protocol fragments following the coding scheme. The coding scheme or model therefore has to be constructed first. There are two types of coding models: weak models and strong models. When protocols are checked for the availability of specific predefined categories this is referred to as a weak model. When the model also indicates all kinds of commitments about combinations and sets of categories this is referred to as a strong model. We will not perform a quantitative, statistical, analysis of the protocols on the basis of a formal coding. We plan a qualitative analysis using our final model of legal case solving (see Fig. 2.11) as a template to explore the protocols and to compare each protocol with. We do this because we take two different points of view. We will look at the protocols from the point of view of order or sequence, which also refers to interdependencies and repetitions (reiterations), and we will look at the protocols from the point of view of content. In analyzing the protocols we first explore the protocols on the basis of the template, followed by a comparison of the protocols with our template. In the exploration we will look at the order, or sequence, subjects use, which involves an inspection of the subtasks, and the content subjects use, which involves an inspection of the input and output data. After the exploration we compare each protocol with the template also both from the point of view of order and the point of view of content. All with the objective to be able to either reject or confirm the following hypotheses:

- Novices are apparent unsystematic legal case solvers, it only looks as if they are working in an unsystematic way, however, on closer inspection they in fact use a system.
- Difficulties in legal case solving are first of all caused by insufficient mastery of, or insight in, the subject matter.
- Methods emerge from problem solving, instead of being the driving force.

We prepared the transcribed protocols for analysis by breaking up sentences in propositions and by rearranging the propositions.
The sequence was rearranged when indicated by the subjects or when it appeared ‘logically’ necessary by the interpreter. The intended sequence is indicated by the subjects’ use of indicators or temporal relations (e.g. before, then, first, etc.).

When protocols were obviously incomplete and it was possible to infer what was implied propositions were added. Incompleteness or gaps may relate to processes of which the subject thinks that the experimenter will know what she is doing. For example, after reading the legal case, the novice may not explicitly state her understanding of the situation description, because this would merely be a recount of the case description. Another example may be the ‘select article’ activity. It may appear later on in the protocol that the subject has selected the article, because she is using it. However, the activity appears difficult to report.

There are also different kinds of verbalizations that are not directly related with solving the legal case. The subject may be talking about issues that have absolutely nothing to do with solving the legal case (for example “O dear I must not forget to apply for the criminal law exam.”), verbalizations that refer to an evaluation of legal case solving at the meta-level (“This is a difficult case.”), or comments on oneself (“I am a bit nervous.”).

### 2.4.3.1 Our template

The template we used in the analysis of the protocols is based on the final model of legal case solving (see Fig. 2.16).

This model not only depicts the subtasks in legal case solving and their interrelations, but also the knowledge bases and the input and output relations.
Figure 2.16: Template. The ellipses indicate subtasks. The rectangles indicate subtask input and output. The arrow links indicate the direction of the flow of knowledge.

We refined the template by specifying the situation description, the legal question(s), the domain knowledge, the structured situation description, the abstract situation description, the reasoning structure and the legal solution for both legal cases used in the experiment (see Appendices A1 and A2).
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We then described each individual protocol in terms of the template. In each protocol the subtasks and the input and output of knowledge were indicated. Here we show a part of a novice protocol described in terms of the template.

<table>
<thead>
<tr>
<th>subtask</th>
<th>statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>structure</td>
<td>a decision of M &amp; A.</td>
</tr>
<tr>
<td>situation</td>
<td>on the basis of article 56 of the Housing Act.</td>
</tr>
<tr>
<td>description</td>
<td>and the corporation is granted permission.</td>
</tr>
<tr>
<td>arrange facts</td>
<td>to use the house as an office.</td>
</tr>
<tr>
<td></td>
<td>at the same time they say that the corporation must make an other house, being an office, suitable for residence for one and two person households.</td>
</tr>
<tr>
<td></td>
<td>in the office there is an other corporation.</td>
</tr>
<tr>
<td>complete facts</td>
<td>well I presume that the decision came to the attention of the corporation.</td>
</tr>
<tr>
<td></td>
<td>and that they see that the decision was taken on 30 July 1981.</td>
</tr>
<tr>
<td></td>
<td>and that they oppose immediately.</td>
</tr>
<tr>
<td>apply rules</td>
<td>article 1 section 1 Arob each person and each body invested with any public authority M &amp; A each person and each body invested with any public authority is M &amp; A</td>
</tr>
<tr>
<td>select rules</td>
<td></td>
</tr>
<tr>
<td>analyze rule</td>
<td></td>
</tr>
<tr>
<td>select fact</td>
<td></td>
</tr>
<tr>
<td>match rule with</td>
<td></td>
</tr>
</tbody>
</table>

In the right column we see the statements of the student in the process of solving the legal case while thinking aloud, in the left column we see as what subtask it is categorized. The type of subtasks also types the content.
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Here the content related to the subtask ‘arrange facts’ uses the situation description as input and the subtask results in the output structured situation description that in turn is the input for the next subtask. This type of description makes it possible to look at the protocols from the point of view of order, or sequence, and from the point of view of content. Not only can we explore if novices are systematic or unsystematic legal case solvers, we can also explore what knowledge is used and how. Describing the protocols in terms of the template not only allows us to compare each protocol with the template, expressing the protocols in the same vocabulary also allows us to compare the protocols with each other. We begin with exploring the protocols to present our first impressions on what we encounter in the protocols. This is followed by comparing the protocols with the template to be able to register similarities, deviations and missing elements in a more systematic way.

2.4.3.2 Exploring the protocols

In our exploration we want to find out if novices really are that unsystematic in their legal case solving behavior. It could be that the sequence of steps cannot be followed that strictly because of interdependencies and repetitions that make that a novice explores a route and when this seems to lead to a dead end, or requires the exploration of an other route, takes another route. This type of behavior may lead to apparent unsystematic behavior that on closer inspection is not that unsystematic at all. It is also possible that novices work in different ways. Legal case solving is the construction of a legal solution for a situation description by applying legal rules. The situation description is a short story that is the starting point for the construction of the legal solution. There are, however, different ways to construct the legal solution. For example, to translate the facts in the situation description into legal terms one can start with selecting the most important fact, or you may select all facts that may seem important and reconstruct the case. The following explorations were carried out:

- novice administrative law case from point of view of order
- novice administrative law case from point of view of content
- novice civil law case from point of view of order
- novice civil law case from point of view of content

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expert administrative law case from point of view of order
from point of view of content
expert civil law case from point of view of order
from point of view of content

Novice administrative law case When exploring the protocols from the point of view of sequence it is striking that all novices do work in a systematic way, and, what is more, they all follow more or less the same system, being the system as depicted in our legal case solving model used in the template. Anecdotal evidence comes from the fact that in exploring the protocols we often had the idea that we had already seen this protocol before. That is, most of the protocols looked alike. What was also striking was that all novices, but one, constructed an incomplete legal solution, where even the novices who do not reach a correct solution follow the same systematic way of solving the legal case.

We also found that although novices do structure the situation description, they mainly do it in their heads. Novices sometimes make notes, however, not one of the novices makes complete notes. The protocols show that facts disappear from sight mainly because it is impossible for the novices to memorize all the details they gather when structuring the situation description. In structuring the situation description the novices do indicate certain facts as highly important. However, because they do not make notes, they forget it in the course of solving the case.

There is, for example, a novice who when structuring the situation description indicates immediately the importance of article 56 of the Housing Act. However, as the novice explicitly states, she does not feel like looking it up immediately. Later on this novice has forgotten all about this article, which in fact is the key to the correct legal solution.

The protocols also show that novices do not keep a complete overview of their legal solution, also mainly because they do not write down their intermediate results. Because they have difficulties memorizing these intermediate results the legal solutions are incomplete.

"Did I already indicate why they can make an objection at all? I do not remember."

There is one novice who explicitly and exhaustingly notes her intermediate results. This novice also constructs the most complete legal solution.
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Although it appears that novices do not work in an unsystematic way, they are incomplete in their approach, which results in an incomplete legal solution. The novices are incomplete in their understanding of the situation description, in their use of the legal knowledge and in their legal solution.

As similar as the sequence of steps, as diverse is the content that is selected and used by the novices. What they do share is the incompleteness of elements they select from the situation description. They all miss elements in the structured situation description, in the abstracted situation description, in the reasoning structure and in the legal solution.

When exploring the protocols from the point of view of content it is striking that novices show insufficient insight in the domain. However, they know that their knowledge is insufficient, that is, they often complain that they are not capable of solving the legal case because of their lack of knowledge or their inability to find what they are looking for.

"I do not have enough knowledge available. So I now have to delve through the entire act as mad, but eh...."

"..there are all sorts of exceptions in the articles 5 and 6 [....] well I do not know these articles so I think I have to go through these articles.."

"I know there should be an article about the specific period within which you have to make an objection, however, I cannot seem to find it, so that leaves me with an unanswered question."

"I know that there is an article about the addressee who can lodge an appeal against an order of M and A and only when the period of appeal is expired a third party can appeal against the decision... I cannot find it fast enough. I do not exactly,... I have to confess...I do not know in what way ...there are certain issues that float up to the surface..., and then, and then, I know more or less what direction we have to take, however, I do not know exactly what explanation to give..."

"I am not that familiar with this subject matter, it is already hard for me to know where to start."
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“I am looking for an article that tells me how the tenant can object.”

“I find it a bit difficult, I do not know where to go and look for it, so...”

“I first have to admit that I do not have been instructed in administrative law in the sense that I would know what...”

“Well, no, I do not know what to do, I do not know where to look for it.”

“What strikes me is how difficult it is to turn out the knowledge.”

“.what is extremely disappointing is the ready knowledge that you have and also .uh.. working with different law books and so on that in fact should make no difference.”

The incompleteness of the legal solution is not only due to the fact that novices do not make notes, it is also due to the complexity of the domain knowledge and the fact that intermediate results have to be inferred from it. The problems with understanding the situation description, the inability to assess their legal solution as complete and the inability of using the legal knowledge can all be traced back to their lack of and insufficient insight in the legal knowledge.

Although novices work in a systematic way they do overlook facts in the situation description and in the legal rules, because they do not know that these facts or articles are important.

Exploring the protocols we see that novices spent much time trying to understand the situation description and much time finding their way in the legal rules and trying to find the applicable article that serves as the key to the solution. The fact that they cannot find the right entrance can be traced back to the abstraction step. The novices do spent much time structuring the situation description, trying to understand the situation description, however, many of them do not spent much time explicitly abstracting the situation description. They do not explicitly translate the facts into legal terms, so they miss so to speak an entrance into the legal rules.
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This also explains their inability to find the applicable legal rules. The novices are not capable of finding the right applicable rules, that is the right content, because the abstraction step is carried out too shallow and incomplete. This may be due to the fact that they lack the domain knowledge. Based on an incorrect or missing abstraction step the selection of the applicable legal rules almost inevitably goes wrong as well, leading to an incorrect legal solution. Although many students do carry out the abstract situation description subtask, the content of the output indicates incompleteness that also causes problems later on in selecting the applicable legal rules.

When the knowledge is lacking the mere searching for possible applicable legal rules does not result in a correct solution either, because the novice lacks the knowledge to assess what is correct or not.

Novice civil law case Although only ten novices solved the civil law case exploring the protocols from the point of view of sequence shows the same type of behavior as with the administrative law case. The novices work in a systematic way, they all follow the same system, being the system as depicted in our legal case solving model used in the template. All novices constructed an incomplete legal solution.

When exploring the protocols from the point of view of content it is striking that the novices do not know what legal rules apply, they sometimes do not even try to find an applicable legal rule.

“There are no articles that come to my mind or whatever, so...”

“.well that is a long time ago...”

“Oh this is terrible, terrible, a terrible case. To start, this is already .. I have done my exams two years ago, that is so long ago.”

“Eh well I do not know, I do not know it by heart.”

“No, well it is possible to try and find it, however, we then probably still be here the day after tomorrow, because I do not know where..”
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“Oh dear, I do not know anything about this anymore, I completely forgot everything about it, that has been years ago, this is going to be fun.”

“I cannot find what I am looking for, there should be an article about obtaining something for nothing.... I dimly recollect that, however, the article that I am looking for, where I can find it, I do not know...”

The protocols show that most of the time is spent reconstructing the situation description to understand the situation and trying to find the applicable legal rules. To summarize:

- novices seem to work in a systematic way
- novices spent much time understanding the situation description
- novices overlook major elements in the situation description
- novices spent little time abstracting the situation description
- novices spent much time applying the legal rules
- novices have difficulties finding their way in the legal rules
- novices overlook elements in the legal rules
- novices do not construct a correct solution
- novices do not construct a complete solution
- novices have difficulties assessing the completeness of the legal solution
- novices forget their prior intermediate results
- novices lose track
- novices are interrupted in their solving process by new ideas
- novices sometimes make, incomplete, notes

**Expert administrative law case** Even though there are only four experts, the difference between the experts and the novices on the administrative law case is already striking. When we explore the experts’ protocols we see that the experts spent hardly any time structuring the situation description. The experts recognize the situation description as a particular type of problem.
However, even so, they spent much more time abstracting the situation description than the novices did. The experts also do not spend much time looking for the legal rules. They apply the legal rules by heart where only in the end they sometimes check the specific wording of an article. This results in a correct legal solution, that is to say, their conclusion is correct, but the argument structure is somewhat incomplete. This incompleteness is due to the fact that many intermediate results remain implicit, although it can be reconstructed that these intermediate conclusions have been drawn given the conclusion. To summarize:

- experts seem to work in a systematic way
- experts recognize the situation description as a specific type of problem
- experts do not spent much time structuring the situation description
- experts spent most of their time abstracting the situation description
- experts do not spent much time applying legal rules
- experts apply the legal rules by heart
- experts do produce the correct conclusion
- experts do not construct a complete argument structure
- experts do not make notes

**Experts civil law case** Even though now only three of the four experts solved the civil law case the differences with the administrative law case are striking. When we explore the experts’ protocols we see that the experts now spent most of their time structuring the situation description and selecting and analyzing the legal rules. Two of the experts do not know what legal rules to select and one expert selects incorrect legal rules. This results in two correct conclusions, but incomplete argument structures. The experts experienced difficulties solving the civil law case. They used expressions as:

"Well that is a long time ago".

"I do not have that knowledge available right now".

"In fact I do not know where to look and what to look for."
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"Well I just do not know anymore, I completely forgot all about it, for me it has been seven years or more already...."

"I do not know, I lost my touch."

In solving the civil law case the experts in fact performed more in the way the novices solved the legal cases.

To be able to confirm our impressions from our exploration we compared each protocol with our template. For each protocol we registered the subtasks and the input and output data in the template to be able to detect deviations and missing elements with regard to sequence and content.

2.4.3.3 Comparing the protocols

The comparison of the protocols with the template made it possible to register similarities, deviations and missing elements. The following comparisons were carried out:

from point of view of order
- novice administrative law case
- novice civil law case
- expert administrative law case
- expert civil law case

from point of view of content
- novice administrative law case
- novice civil law case
- expert administrative law case
- expert civil law case

In the comparison from the point of view of order we took the part of the template that depicts the sequence, compared each individual protocol with the elements in the sequence and registered not only the presence of the elements, but also the order in which they are carried out and the repetitions and iterations. We used numbers to indicate the presence and order of a subtask. So, for instance, when a novice started with structuring the situation description we placed a 1 in the ellipse depicting the subtask, however, when a novice started with apply legal rules, we placed a 1 in the ellipse depicting this subtask.

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In comparing the protocols from the point of view of content we took the input - output parts of the template. We used the standard structured situation description, the standard abstracted situation description, the standard reasoning structure and the standard legal solution (see Appendices A.1 and A.2). We compared each individual protocol with the elements in the descriptions and registered not only the presence of the elements, but also the order in which they are mentioned. We numbered the elements in the standard descriptions, made a table with a row for each novice and expert and a column for each element in the specific description. So, for instance, when novice number 1 is engaged in structuring the situation description we placed a 1 in row 1 for the first element she mentions in the column related to this element. This resulted in tables for the structured situation description, abstracted situation description and the reasoning structure. As stated before, we see the legal solution as consisting of an argument structure and a conclusion. The argument structure is the reasoning structure being the outcome of the apply legal rules subtask, where the conclusion is the answer to the question related to the situation description that has to be solved. Because there already is a table for the reasoning structure, we did not make yet another table for the legal solution. However, we did make an inventory of the conclusions indicating the completeness and the correctness of the legal solution.

A legal solution is complete when there is a complete argument structure and a conclusion, an argument structure is complete when there is a complete reasoning structure, being the outcome of the apply legal rules subtask. A legal solution is correct when the argument structure, being the reasoning structure, and the conclusion are in accordance with the standard reasoning structure and conclusion.

Novice administrative law case Comparison the novice protocols with the template on the administrative law case from the point of view of order, or sequence, results in the following picture (see Fig. 2.17).
Novices solve the administrative law case by carrying out the subtasks in the order as depicted in the template. The ‘structure situation description’ subtask is subdivided in ‘gather facts’, ‘proof facts’, ‘arrange facts’ and ‘complete facts’. All novices start with structuring the situation description, in this case it involves merely arranging the facts, where five novices also...
complete facts, that is, they make the implicit inferences in the situation description explicit. The majority, being 22 novices, continues with abstracting the situation description, where only 3 novices skip this subtask. There is one novice who only structures the situation description and one novice who only structures and abstracts the situation description, so this leaves us with 23 novices who apply legal rules. For three of them this is the second subtask because they skipped the abstraction step, for the other 20 novices this is the third step, being exactly the order as indicated in the template. The ‘apply legal rules’ subtask is subdivided in ‘select applicable legal rule’, ‘analyze legal rule’, ‘select fact’ and ‘match legal rule with fact’. The novices carry out these activities in this order, where they repeat this quartet for each applicable legal rule selected, although sometimes when a legal rule has been analyzed and assessed as not relevant they do not select a fact or match this legal rule to the fact, mainly because this is not relevant.

Six of the novices carry out the subtasks in an iterative cycle, repeating the successive steps of structure situation description, abstract situation description and apply legal rules. The majority, being 17 students, however, walks through the successive subtasks only once in the order structure situation description, abstract situation description and apply legal rules. There is one novice who only structures and one novice who only structures and abstracts.
Novice civil law case Comparing the novice protocols with the template on the civil law case from the point of view of order or sequence results in the following picture (see Fig. 2.19). Novices solve the civil law case by carrying out the same subtasks in the same order as depicted in the template. All subjects start with structuring the situation description and carry on with abstracting the situation description. This is followed by the apply legal rules subtasks, however only seven out of ten carry out this subtask. Three novices end their legal case solving with the abstraction step.
These three novices carry out the structure situation description and abstract situation description in iteration, where the other seven novices carry out the structure, abstract and apply subtask in iteration.

**Expert administrative law case** Comparing the expert protocols with the template on the administrative law case from the point of view of order, or sequence, results in the following picture (see Fig. 2.21). Experts solve the administrative law case by carrying out the subtasks structure situation description, abstract situation description and apply legal rules. However, the experts do spent little time with structuring the situation description. Most of their time is spent abstracting the situation description.
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Figure 2.21: Expert sequence administrative law case.
Two of the experts structure and abstract in iteration before applying the legal rules, where the other two carry out the abstract and apply legal rules in iteration.

**Figure 2.22: Expert repetition administrative law case.**

**Expert civil law case** Comparing the expert protocols with the template on the civil law case from the point of view of order or sequence results in the following picture (see Fig. 2.23). Experts solve the civil law case by carrying out the subtasks structure situation description, abstract situation description and apply legal rules. However, the experts spent most of their time structuring the situation description.
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Figure 2.23: Expert sequence civil law case.
All three experts structure and abstract in iteration, before applying the legal rules, although one of them does not apply any legal rules.

**Novice administrative law case** Comparing the novice protocols with the template on the administrative law case from the point of view of content resulted in tables depicting the presence of elements and the order in which they were mentioned by the novices. There is a table for the structured situation description; a table for the abstracted situation description, and a table for the reasoning structure. Rows depict the individual novice’s elements, where columns depict the number and order of elements. So, for instance, in the structured situation description of novice number 1 the first element this novice selected in comparison with the standard structured situation description, is element 1, the second element she selected is element 6, the third element is element 3 and so on\(^\text{19}\).

\(^{19}\) The numbers refer to the number of the novice in the experiment. The data of novice number 2 could not be incorporated in the analysis because the tape was damaged.
Table 2.1: Novice structured situation description administrative law case. Where nov = novice, elm = element.

Table 2.1 presents the elements that novices select from the situation description and that appear in the structured situation description after structuring the situation description. It shows that:

(1) all novices select elements
(2) all novices leave out some elements in comparison with the standard
(3) there is a relatively large variety in the order of elements selected
Table 2.2: Novice abstracted situation description administrative law case. Where nov = novice, elm = element.

Table 2.2 shows the elements presented by the novices in the abstracted situation description. It shows that: (1) not all novices abstract elements (2) the novices who do abstract elements all except two leave out elements in comparison with the standard (3) there is variety in the order of elements selected. The key element, element number 3, has been selected by a majority of the novices (19 novices).
| nov | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25/  | 26  | 27  | 28  | 29  | 30  |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1   | -  | -  | -  | -  | -  | -  | 10 | 3  | 4  | 5  | 1  | -  | 2  | -  | 6  | 7  | 8  | 9  | -  | -  | 11 | -  | -  | -  | -  | -  | -  | -  | -  |
| 2   | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 3   | -  | -  | -  | -  | -  | -  | -  | 1  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 4   | 1  | -  | -  | 2  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 5   | -  | -  | -  | -  | -  | -  | 1  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 6   | 1  | -  | -  | 2  | 3  | -  | -  | 4  | 5  | 6  | -  | 7  | -  | 8  | 9  | 10 | -  | 11 | -  | -  | 12 | -  | -  | -  | -  | -  | -  | -  |
| 7   | -  | -  | -  | -  | -  | 1  | 2  | -  | -  | -  | -  | -  | 3  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 8   | 1  | -  | -  | 2  | 3  | -  | -  | 4  | 5  | 6  | 7  | -  | 8  | 9  | 10 | 11 | -  | -  | -  | -  | 12 | -  | -  | -  | -  | -  | -  | -  |
| 9   | 1  | 2  | -  | 4  | 5  | -  | -  | 3  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 10  | 1  | 3  | 4  | 5  | 2/6| 7  | 8  | -  | 9  | 10 | 13 | -  | 14 | -  | 12 | 15 | -  | -  | -  | 16 | 17 | -  | 18 | 19 | -  | -  | -  | -  |
| 11  | -  | -  | -  | -  | -  | 12 | 13 | 7  | 8  | 1  | 2  | 3  | 4  | -  | 5  | 6  | 14 | -  | -  | 9  | 10 | -  | 16 | 17 | 18 | 19 | 20 | 11 | 15 | 21 |
| 12  | 1  | -  | -  | 2  | 3  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 13  | -  | -  | -  | -  | -  | -  | 1  | 2  | 3  | 4  | -  | 5  | 6  | 7  | 8  | -  | 9  | 10 | 11 | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 14  | -  | -  | -  | -  | -  | -  | 3  | 4  | 5  | 1  | -  | 2  | -  | 6  | 7  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
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| 16  | 1  | 2  | 5  | 6  | 3  | 4  | -  | 7  | 8  | 9  | -  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | -  | 20 | 21 | 22 | 24 | 25 | 26 | 27 | 28 | 23 |
| 17  | 1  | 2  | 5  | 6  | 3  | 4  | 7  | 8  | 11 | 12 | 13 | 17 | -  | 14 | -  | 15 | 16 | 10 | -  | -  | 9  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 18  | 1/ | 2  | 3  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 19  | -  | -  | -  | -  | 1  | 2  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 20  | -  | -  | 1  | 2  | 3  | 4  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 21  | 1  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 22  | 1  | -  | 2  | 3  | 4  | 5  | 8  | -  | 7  | -  | -  | -  | -  | 6  | -  | -  | -  | -  | -  | 9  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 23  | 1  | 2  | 3  | 4  | 5  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 24  | -  | -  | 1  | 2  | 3  | 4  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 25  | 1  | 2  | 3  | -  | 4  | 5  | 6  | -  | 7  | -  | -  | -  | -  | -  | 8  | 9  | -  | 10 | 11 | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| 26  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |

Table 2.3: Novice reasoning structure administrative law case. Where nov = novice, elm = element.
Chapter 2 Legal Case Solving

Table 2.3 shows the elements presented by the novices in the reasoning structure. It shows that: (1) all novices, except one (novice number 26), apply legal rules (2) novices leave out elements in comparison with the standard (3) there is variety in the order of elements.

Article 56 of the Housing Act is the key article in the construction of the legal solution. Although this article is specifically mentioned in the situation description there are still 10 novices who do not use the article. Article 56 section 3 of the Housing Act states that the applicant may appeal. Five novices make an essential mistake by stating that the Provincial Corporation for Mental Health in Limburg is the applicant. There is one novice who does not apply any rule, that is she does not select any rule or fact and she does not match any rule to any fact. Then there are two novices who start with selecting legal rules from the area of civil law, more specifically the Rent Act. Both novices explicitly state that they know much about this area of law, because they recently took an exam on the subject of rent. A correct legal solution consists of a correct and complete argument structure and a correct and complete conclusion.

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<td>3, 5, 13, 15</td>
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</table>

Table 2.4: Novice legal solution administrative law case.

Table 2.4 shows that with this definition of solution only four novices succeed in presenting such a correct and complete legal solution (novices 10, 11, 16 and 17).

---

20 In Dutch: de Huurwet.
The overview shows that there are many incorrect conclusions, incorrect argument structures and incomplete argument structures. A complete conclusion may be either correct or incorrect, however, the incomplete conclusions are all incorrect. All complete argument structures are also correct argument structures. However, there are also incomplete but correct argument structures. We have registered four novices as presenting complete argument structures (novices 10, 11, 16, 17). If we take the reasoning structure as the model for completeness, not one of the novices has a complete argument structure. However, these four novices showed the most complete reasoning structure (see also Table 2.3). Although novices may present a correct conclusion, the overview shows that the conclusion can be made based on an incomplete and even on an incorrect argument structure. There is also one novice (novice 22) who presents a wrong conclusion on the basis of a correct argument structure. The most complete and correct legal solution is found with novices 11 and 16. These legal solutions are based on a reasoning structures that are also rather complete as compared with the model.

**Novice civil law case** Comparing the novice protocols with the template on the civil law case from the point of view of content.21

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Table 2.5: Novice structured situation description civil law case.

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21 There were 10 novices that solved the civil law case. Novices number 1, 3, 4, 5, 6, 12, 13, 14, 15 and 16.
Table 2.5 shows the elements that novices select from the situation description and that appear in the structured situation description after structuring the situation description. It shows that:
(1) 9 out of 10 novices select elements
(2) 9 out of 10 novices leave out elements in comparison with the standard
(3) there is a relatively large similarity in the order of elements selected

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Table 2.6: Novice abstracted situation description civil law case.

Table 2.6 depicts the elements presented by the novices in the abstracted situation description. It shows that:
(1) all novices abstract elements
(2) 8 novices leave out elements in comparison with the standard
(3) there is some variety in the order of elements selected
The key element, element number 3, has been selected by the majority of the novices (7 novices).
An Instructional Environment for Learning to Solve Legal Cases

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Table 2.7: Novice reasoning structure civil law case.

Table 2.7 shows the elements presented by the novices in the reasoning structure. It is striking that there are almost no elements present. The majority of the novices did not apply any legal rules, that is they did not select any legal rule or analyze it to be able to select facts that match the legal rule. What is also striking is that the majority does not apply legal rules. They do not select any rule. There are three novices who refer to the possibility that article 1401 of the Civil Code may be the applicable article, however, they do not select the article\(^\text{22}\). A correct legal solution consists of a correct and complete argument structure and a correct and complete conclusion.

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<th>Conclusion</th>
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<td>incomplete</td>
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</tbody>
</table>

Table 2.8: Novice legal solution civil law case.

\(^{22}\) Article 1401 is now article 162 section 2 in book 6 of the Civil Code and defines ‘tort’.
Chapter 2 Legal Case Solving

Table 2.8 shows that with this definition of correct solution none of the novices presents such a solution. Although there are three novices who come up with the correct conclusion (novices 1, 12 and 15) these conclusions are all based on an incorrect and incomplete argument structure, where in the case of novice 15 it is also even based on an incomplete conclusion. This is to say, novice 15 does not make a definite conclusion, she only refers to the correct conclusion and with that her answer more or less fades away.

**Expert administrative law case** Comparing the expert protocols with the template on the administrative law case from the point of view of content.

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Table 2.9: Expert structured situation description administrative law case.

Table 2.9 shows the elements that experts select from the situation description and that appear in the structured situation description after structuring the situation description. It shows that:
(1) 2 experts select elements, 2 do not
(2) the experts that do select elements leave out many elements in comparison with the standard

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Table 2.10: Expert abstracted situation description administrative law case.
Table 2.10 shows the elements presented by the experts in the abstracted situation description. It shows that:
(1) all experts abstract elements
(2) they leave out elements in comparison with the standard
(3) there is a similarity in the order of elements selected
The key element, element number 3, has been selected by all experts.
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</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

Table 2.11: Expert reasoning structure administrative law case.
Table 2.11 shows the elements presented by the experts in the reasoning structure. It shows that:
(1) all experts apply legal rules
(2) all experts leave out many elements in comparison with the standard
(3) there is some variety in the order of elements

A correct legal solution consists of a correct and complete argument structure and a correct and complete conclusion.

<table>
<thead>
<tr>
<th>argument structure</th>
<th>conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>correct</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>incorrect</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>complete</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>incomplete</td>
<td>1, 2, 3, 4</td>
</tr>
</tbody>
</table>

Table 2.12: Expert legal solution administrative law case.

Table 2.12 shows that all experts present a correct and complete conclusion. However, this conclusion is based on a correct but incomplete argument structure (see also Table 2.11).

**Expert civil law case** Comparing the expert protocols with the template on the civil law case from the point of view of content.

<table>
<thead>
<tr>
<th>elm</th>
<th>exp</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</td>
</tr>
<tr>
<td>3</td>
<td>1 2 8 3 4 5 6 7</td>
</tr>
<tr>
<td>4</td>
<td>1 2 8 3 4 5 6 7</td>
</tr>
</tbody>
</table>

Table 2.13: Expert structured situation description civil law case.

Table 2.13 shows the elements that experts select from the situation description and that appear in the structured situation description after structuring the situation description. It shows that:
(1) all experts select elements
(2) all experts leave out elements in comparison with the standard
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Table 2.14: Expert abstracted situation description civil law case.

Table 2.14 shows the elements presented by the experts in the abstracted situation description, showing:
(1) all experts abstract elements
(2) they leave out elements in comparison with the standard
The key element, element number 3, has been selected by all experts.

Table 2.15: Expert reasoning structure civil law case.

Table 2.15 shows the elements presented by the experts in the reasoning structure. It is striking that there are no elements present. The experts did not apply any legal rules, that is they did not select any legal rule or analyze it to be able to select facts that match the legal rule.

A correct legal solution consists of a correct and complete argument structure and a correct and complete conclusion.

Table 2.16: Expert legal solution civil law case.
Table 2.16 shows that with this definition of correct solution none of the experts presents such a solution. All three of them produce an incomplete and incorrect argument structure, where two of them state the correct conclusion, however, for one of them this conclusion is more or less a guess and not a definite conclusion, she only refers to the correct conclusion and with that her answer more or less fades away. The third expert produces an incorrect conclusion.

On the basis of these results we will now determine whether our findings confirm our hypotheses or not.

2.4.4 Results

We gathered verbal data and analyzed the protocols using our final legal case solving model as the interpretation model to be able to determine how law students and how legal practitioners solve legal cases, what type of difficulties appear and what we may designate as causes for these difficulties. We hypothesized that:

- Novices are seemingly unsystematic legal case solvers, it only looks as if they are working in an unsystematic way, however, on closer inspection they in fact use a system.
- Difficulties in legal case solving are first of all caused by insufficient mastery of, or insight in, the subject matter.
- Methods emerge from problem solving, instead of being the driving force.

We now evaluate our hypotheses on the basis of the outcomes of the analysis.

2.4.4.1 Evaluating the hypotheses

To test our first hypothesis that novices are apparent unsystematic legal case solvers we explored the protocols and compared each protocol with our template from the point of view of order, or sequence.
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There are basically two possible outcomes:

- the protocol matches the order in the model
- the protocol does not match the order in the model
  - it shows another order
  - it does not show any order at all

If the protocols match the order in the model we may confirm our hypothesis. If the protocols do not match the order in the model it may be the case that the model predicts activities not shown by the protocols, or that the protocols show activities which are not predicted by the model, or that the protocols show activities in a different sequence than predicted by the model. Our findings show that the protocols match the order in the model. We may confirm our hypothesis. We may even accentuate our hypothesis on the basis of our findings: novices are systematic legal case solvers.

To test our second hypothesis that difficulties in legal case solving are first of all caused by insufficient mastery of, or insight in, the subject matter we explored the protocols and compared each protocol with the template from the point of view of content. We want to find out if novices have difficulties in legal case solving and if so if we can attribute these difficulties to insufficient mastery of, or insight in, the subject matter. We therefore first have a look at what knowledge is used. The template we use shows three different knowledge input roles: the situation description, the related question and the domain knowledge, being the applicable legal rules. The template describes which elements have to be used. There are basically two possible outcomes:

- the protocol matches the content in the model
- the protocol does not match the content in the model

Before we are able to confirm our hypothesis we have to examine if the outcome of either a match or deviation with our template with regard to content is the cause for difficulties in legal case solving.
We may confirm our hypothesis when the protocols do not match the model and the novices show an incomplete structured situation description, an incomplete abstracted situation description, an incomplete reasoning and an incomplete legal solution. Our findings show that the protocols partially match, or do not match, the content in the model. Novices do show incomplete structured situation descriptions, incomplete abstracted situation descriptions, incomplete reasoning structures and incomplete and incorrect legal solutions.

To test our third hypothesis that methods emerge from problem solving, instead of being the driving force, we compared the expert protocols on the administrative law case with the expert protocols on the civil law case. If legal case solving is mainly the application of a method, a comparison of the protocols should show that they work in the same systematic way in both legal cases resulting in a correct and complete legal solution in both cases. However, if the primacy is with the legal knowledge the comparison should show that they are better able to solve the administrative law case then the civil law case. To be able to test this hypothesis we used two legal cases, an administrative law case and a civil law case. The experts are experts in the field of administrative law, however, they are no experts in the field of civil law. If the experts used an explicit legal case solving method in the first legal case, they will apply this legal case solving method also in the second legal case. On the basis of these findings the conclusion is justified that the experts do not use a method for solving legal cases. Because if they did use such a method in the first legal case, which resulted in the correct solution, why not use the same method in the second case?

2.4.4.2 Difficulties experienced by students

The protocols show that although novices do work in a systematic way, however, they still have difficulties solving a legal case. Novices show incomplete structured situation descriptions, incomplete abstracted situation descriptions, incomplete reasoning structures and incomplete and incorrect legal solutions.

Managing the information A problem for novices with regard to solving legal cases is the management of the information during the problem solving process.
A student needing pen and paper in the process of solving a problem indicates that there is an information processing problem due to the limits of human memory. There is an information management problem for novices in situations where multiple outcomes have to be kept. It appears difficult for novices to remember and keep up with the various temporary solutions and in-between inferences. Although this is a common problem experienced by all novices who need to solve problems it could be stated that the use of regulations present novices with specific difficulties. It is difficult for novices to grasp the system and structure of statutes. Reasons for this are, for example, that some articles are exceptions to other articles in a statute, that articles may contain explicit references to other articles or statutes, that articles may contain implicit references to other articles or statutes (by the place of the article in the statute or by using certain concepts) and the fact that some articles are in conflict with other applicable articles.

**Finding your way in the legal knowledge** The second problem novices experience is to find their way in the legal knowledge. The novice protocols show incomplete structured situation descriptions, incomplete or missing abstracted situation descriptions, incomplete reasoning structures and incomplete legal solutions.

It appeared that novices do not know where to look for the domain knowledge and what domain knowledge to look for. The main cause of the incompleteness of the various knowledge components is the complexity of the domain knowledge, where the articles are difficult to read and difficult to comprehend because of the use of exceptions (e.g. 'providing that', 'unless') and the fact that consequences have to be partially inferred. Legal knowledge is described by articles that do not constitute a coherent text, (legal) knowledge has to be inferred on the basis of the articles and as usual they are riddled with exceptions.

Therefore there is no simple mapping between a case at hand and the text of the law, and one has to go back and forth in order to identify applicable articles. Novices are not able to analyze a situation description systematically, because students do not dispose of sufficient insight into the major conceptual structure and into the world of, for example, administrative law. It takes a long time to acquire insight in the mapping between the textual organization of the law and the conceptual structure that cannot be acquired by simple explanation. The identification of terms of the law in the situation description is also problematic.
Novices do not take sufficiently care that the interpretation of the problem situation is complete. They map partial situation descriptions to constraints without carefully checking whether the assumptions are satisfied, a kind of ‘jumping to conclusions’. Moreover, their lack of overview does not allow them to mentally keep track of sufficient covering of the problem situation.

**Constructing a legal solution** Another problem is that novices do not see legal case solving as a construction process that has to result in a product being the legal solution. They do not see legal case solving as a construction process, in which a legal solution is constructed using the knowledge from the situation description, the related question and the domain knowledge, being the basic concepts and the legal rules in the domain of practice. Students also have difficulties assessing the completeness of the legal solution.

**2.4.5 To Sum Up**

With our hypotheses we disagreed with the interpretation by Crombag and colleagues that difficulties of students with legal case solving are caused by the lack of a method. However, based on our findings, we now also fight their observations that students are unsystematic legal case solvers.

Our observations are that novices do not work in an unsystematic way, however, they are incomplete in their approach, which results in an load incomplete legal solution. This incompleteness can be observed in the understanding of the problem situation (structured situation description and abstracted situation description), the incompleteness of the legal solution and the incomplete use of the legal knowledge available to them. The insufficient insight in, or mastery of, the subject matter is the major cause for this incompleteness.

Our suggestions for improving students’ legal case solving performance are:

- support the student in constructing the legal solution
- support the student in her information management to relieve memory load
- support the student in finding her way in the legal knowledge
Our suggestions for realizing the support is to have the student construct a legal solution where some systematic guidance is presented to prevent “jumping to conclusions”, to support the complete analysis of the situation description and to support the construction of a complete and correct legal solution. The information management can be supported by restricting activities, that is by taking over some of the activities that interfere with correct task performance. The systematic guidance and the restriction of activities can be realized by externalizing the basic components that play a role in solving a legal case. To summarize:

- externalization
- systematic guidance
- restricting activities

The analysis of the protocols also shows the major and important role of the legal knowledge and the difficulties that arise from it. Therefore it is inevitable to have a closer look into the characteristics of the legal knowledge and the specific role of that knowledge in legal case solving to come up with suggestions for supporting the novice in finding her way in the legal knowledge.

2.5 Conclusion

Law students have to learn legal case solving by actually and successfully solving legal cases. There is no other way. A novice learns to solve problems by actually solving problems. There are two aspects related to learning problem solving. For one learning by doing requires a task to perform. This requires an analysis of what it takes to solve a legal case to be able to perform the task correctly. Secondly the learning process should be facilitated. The subject of this chapter concerned the conceptualization of the task of legal case solving using a theoretical framework. Our theoretical framework describes the various components that can be distinguished in the problem solving process. We used this framework to examine a variety of sources on legal case solving. Expressing the different views in the same vocabulary enabled us to compare these views. To arrive at our framework we focused on problem solving research in the field of cognitive psychology and artificial intelligence for the following reasons.
Cognitive psychology actually studies problem solving processes, where artificial intelligence strives to build problem solvers and therefore has to specify the components in problem solving very explicitly. The components distinguished in the problem solving process are problem solving method, domain knowledge and case, or situation, model.

The two major steps in problem solving are basically the recognition of the problem situation (incomplete case model) and the solving of the problem using related problem solving methods (complete the case model).

We discussed that problem solving methods can be detected by typing the problem, where in turn the type of problem is characterized by its solution. When the problem is typed the task for solving the problem can be selected and executed. The task in turn contains problem solving methods for its execution.

What does legal case solving imply? We examined a variety of theoretical legal sources on legal case solving using the framework and vocabulary described in advance to express these views to be able to compare them and to indicate possible deviations and deficiencies to be able to come up with a conceptualization of the task to be able to perform the task correctly.

The different sources show an agreement on the basic activities, however, they do not give us any insight in how we actually have to perform these activities. It appears that without the content the method can not be performed. We therefore (re)turned to AI & Law research to find out how the task structure is related to domain knowledge. The legal assessment model identifies the basic activities in solving a legal case, but also explicitly refers to the legal knowledge where different types of knowledge are distinguished based on their role in the legal case solving process. Our conceptualization resulted in our legal case solving model.

We needed such a legal case solving model to be able to confirm or reject our hypotheses. We hypothesized that novices are apparent unsystematic legal case solvers, they in fact use a system, that difficulties in legal case solving are first of all caused by insufficient mastery of, or insight in, the subject matter and that a method emerges from legal case solving rather than being the driving force behind it. An experiment was carried out to shed some light upon these issues and to be able to either reject or confirm our hypotheses. Novices (law students) and experts (legal practitioners in the field of administrative law) were asked to solve legal cases while thinking aloud. The protocols were analyzed using our legal case solving model.
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We performed a qualitative analysis exploring and comparing the protocols on the basis of this model that was used as a template. We looked at the protocols from the point of view of order or sequence and from the point of view of content. On the basis of our results we were able to state that as far as order or sequence is concerned novices work in a systematic way. However, as with regard to content they all show incompleteness of elements in the input and output (structured situation description, abstracted situation description, reasoning structure and legal solution). You must be able to recognize the problem situation in terms of the discipline on the basis of the available knowledge. All novices have problems with understanding the situation description. This indicates that they have insufficient mastery of, or insight in, the subject matter. All novices also have difficulties with applying the legal knowledge, mainly because they cannot find the applicable legal rules. This is yet another indication that they have insufficient mastery of, or insight in, the subject matter.

Novices have problems with managing the information and with finding their way in the legal knowledge. These problems are both caused by the complexity of the domain knowledge.

The way the experts solved the case in their field of expertise compared to how they solved a case outside their field of expertise showed that a method emerges from legal case solving rather than being the driving force behind it. Our observations conflict with the observations of Crombag and colleagues. We observed that novices do not work in an unsystematic way, however they do show incomplete and often incorrect legal solutions caused by their insufficient mastery of, or insight in, the subject matter.

To improve law students legal case solving performance we suggested to support students in constructing a legal solution, to support students in managing the information and to support students in finding their way in the legal knowledge.

To realize this support we suggest to have the student construct a legal solution for a problem situation where the management of information can be supported by offering some systematic guidance to keep students on track and by restricting the activities to be carried out by the student. Both the systematic guidance and the restriction of activities can be realized by externalizing the basic task components and task characteristics.
An Instructional Environment for Learning to Solve Legal Cases

PROSA

We conceptualized the task of legal case solving and we specified students’ difficulties in order to arrange instruction to improve legal case solving performance. Our findings show that students do not work in an unsystematic way, however, they do produce incomplete and incorrect legal solutions due to insufficient mastery of, or insight in, the subject matter. The complexity of the domain knowledge causes information management problems and difficulties in finding your way in the knowledge. As a remedy we propose the externalization of the task characteristics and task components. Such an externalization offers systematic guidance preventing students to jump to conclusions, to keep them on track and to hold on to intermediate results. It also restricts the activities to be carried out in such a way that the student is able to focus on the key aspects in solving a legal case. We revealed that the major role in solving a legal case is reserved for the domain knowledge, therefore we present a closer inspection of the legal knowledge and more specific ways to support students in acquiring mastery of that knowledge in Chapter 3.