

Accepting the truth of a story about the facts of a criminal case

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Abstract

Crombag, Van Koppen and Wagenaar have proposed the anchored narratives theory as a tool for establishing and identifying the facts of a criminal case. The theory emphasises the role of stories in reasoning about the facts, and the pivotal function of anchoring generalisations. Here the anchored narratives theory is reconstructed in terms of semi-formal argumentation schemes, a method borrowed from recent research crossing the fields of argumentation theory and artificial intelligence. Hence we provide an elaboration and refinement of the anchored narratives theory, and are able to show how stories can play an explicit role in reasoning about the facts. In the present approach, not only the elements of stories are part of argumentation, but also stories as wholes. We argue that accepting one story (typically about the facts of the crime) can depend on the acceptance of other stories (typically about pieces of evidence) and that a more elaborate theory of story structures is required, one in which other story structures than only one for intentional crime is distinguished.

1 Introduction

One task in legal decision making is to decide about the facts of a case on the basis of the available evidence. This task is not always easy¹; often the evidence in a case points in different directions, for example, when witnesses contradict each other. Determining what exactly can be concluded from the evidence is also not an easy or trivial task. For instance, when an accused's footprints are found on the scene of the crime one is tempted to assume that the accused has committed the crime, while the footprints by themselves only point in the direction of the accused being present.

Reasoning about the facts of a case has been studied in several disciplines. For example, in the psychology of law Crombag, Van Koppen and Wagenaar have proposed the anchored narratives theory (1992, 1994; 1993): legal decisions about the facts of a case are analyzed in terms of structured stories anchored in common knowledge.

This research raised a significant amount of discussion, both among legal professionals in the Netherlands and among evidence theorists. The debate in the legal profession was not a surprise, as it was one of the goals of the authors. Their style, described as 'in some respects closer to 'higher journalism' than to 'scientific' publications' (Twining 1995, p. 109), was intentionally provocative as Crombag, Van Koppen and Wagenaar aimed at exposing a failure of the legal system: they argue that too often errors occur when deciding about the facts in criminal cases. Their work can be regarded as a form of social criticism in that it aims to reduce the number of miscarriages of justice, or 'dubious cases' as they call them.

Perhaps somewhat more of a surprise was the critical - albeit civilized - reception of the anchored narratives theory among evidence theorists (e.g., Twining 1995, Den Boer 1995). Among the points of criticism raised were: an

¹ Whether the task of deciding about the facts is well-defined (considering the problematic, but legally relevant, distinction between questions of fact and of law) is a matter that we ignore here.

imprecise use of terminology, especially concerning the central notions of story and argument (Twining 1995, p. 109); the treatment of pieces of evidence as a story instead of as a means of argument (Twining 1995, p. 110); the lack of distinction between descriptive and prescriptive goals (Twining 1995, p. 108; Den Boer 1995, p. 328-9), exemplified by the lack of distinction between empirical generalisations and prescriptive rules; the presentation of too simple, over-generalized universal rules of evidence (Twining 1995, p. 113); and an unclear role of on the one hand commonsense generic beliefs and on the other commonsense knowledge of scenarios (Den Boer 1995, p. 334).²

One thread through these points of criticism is the allegedly insufficient precision and detail of the presentation of the theory of anchored narratives that formed the basis of Crombag, Van Koppen and Wagenaar's project. In the present text this overarching point of criticism is used as a starting point; the goal is to give a treatment of the anchored narratives theory that does justice to the original description by Crombag, Van Koppen and Wagenaar while increasing the precision of its description. We do this by using a specific technique: the methodological development of a coherent set of semi-formal argumentation schemes (to be explained below). Although the aim is to stay close to the original description the result of this paper is necessarily a reconstruction, an interpretation. Certain choices are made, some of them explicitly for reasons that will be explained, others inadvertently by personal predisposition or biased reading. Also, by the choice of method some themes are enlarged upon while others are neglected. For instance, the method abstracts from procedural constraints, which nevertheless is a recurring theme in the discussions by Crombag, Van Koppen and Wagenaar.

The method chosen is that of analyzing and developing argumentation schemes as presented by Verheij (2003b). The method takes Walton's work on argumentation schemes (especially his 1996) as a starting point and is styled towards formal techniques in the field of artificial intelligence and law (cf., e.g., Prakken 1997, Hage 2005). In the method, argumentation schemes are treated as a semi-formal generalization of the formal rules of inference of logic and argumentation schemes are specified in terms of their conclusion, premises, exceptions and conditions of use.

By choosing this semi-formal method the paper connects to a suggestion made by Crombag, Van Koppen and Wagenaar; when they contrast their theory with logical inference theories, they allude to the possibility of extended logical systems that are better suited as models of legal decision making than the subsumption model (1993, p. 22). Especially in the field of artificial intelligence and law such extended logical systems have been designed. Among the topics addressed in these legal logics are exceptions, inconsistencies, gaps, contingent validity and rule properties (see Sartor's comprehensive 2005 work for an overview of the possibilities).

This text is a development of earlier work on reasoning with evidence, anchored narratives and argumentation schemes (Verheij 2000, 2003b; Bex et al. 2003; Bex, Prakken et al. 2007) in the context of the project 'Making sense of evidence' (Bex, Van den Braak et al. 2007). Whereas previously we emphasized the formal modelling of defeasible arguments about story elements, we here use the semi-formal approach of argumentation schemes and show how stories as wholes can have an explicit role.

The rest of this text is organized as follows. In section 2, the theory of anchored narratives is summarized. Section 3 is about dialectical argumentation

² Twining (1999) has given a useful adapted and extended discussion of the points of agreement and disagreement between the anchored narratives approach and the school that is inspired by Wigmore, with authors such as Anderson, Schum and Twining himself. Cf. also Anderson et al. 2005.

and argumentation schemes. Section 4 is the heart of this paper: it contains the reconstruction of the theory of anchored narratives in terms of argumentation schemes. The resulting set of argumentation schemes is listed in an appendix. Section 5 contains some concluding remarks.

2 Anchored narratives³

In their books *Dubieuze zaken* (1992, 1994, p. 61f.) and *Anchored narratives* (1993, p. 33f.), Crombag, Van Koppen and Wagenaar present the theory of anchored narratives as a model of legal decision making. The starting point of the theory is that proof in a criminal trial comes down to telling a good story. In the following the theory of anchored narratives is summarized. More information about the theory and many examples illustrating it can be found in the books mentioned.

In the theory of anchored narratives courts make two judgments in criminal cases in order to establish the facts. First, they determine whether the stories of the parties before them (i.e., the prosecution and the defence) are plausible. Here the *quality* (or *goodness*) of the stories is at issue. Second, courts decide whether the available evidence is sufficiently supported by facts. This is where the *anchoring* of stories is examined.

Crombag, Van Koppen and Wagenaar consider their theory to be a natural development of earlier research on stories in legal psychology. In this research, stories provide the context that gives meaning to the individual elements of the story. This can be illustrated by the following mini-story:

Peter fired a gun. George was hurt.

When one is told this mini-story, one is inclined to assume that George was hurt by Peter shooting the gun. This is however not an explicit part of the story, and can be false.

Crombag, Van Koppen and Wagenaar base their discussion about the quality of stories on earlier work by Bennett and Feldman and Pennington and Hastie. According to Bennett and Feldman, a good story has a central action, to which all elements of the story are related. In the above example, the event that Peter fired a gun explains the action that George was hurt. A good story does not have loose ends. That is, in a good story the setting of the action unambiguously explains why the central action occurred as it did. If not, there are elements missing from the story, or there are contradictions.

Pennington and Hastie extended the theory by Bennett and Feldman; they argue that in a good story, the central actions and their consequences can be causally explained by three types of factors: physical conditions, psychological conditions and goals. So a good story must contain the accused's motives and show that the accused had the opportunity to commit the crime.

An experiment by Pennington and Hastie has shown that a set of evidence in a case does not guarantee a unique outcome. It turned out that, in a case where a person was killed, by different selections and evaluations of the evidence test persons reached outcomes ranging from first-degree murder, through second-degree murder and manslaughter, to self-defence. In another experiment, Pennington and Hastie showed the influence of story order on verdicts. The party's positions about the event that was to be explained, in this case that a dead person was found, were presented to the test persons either in chronological story order, or in random order, such as the order in which witnesses gave their testimonies. It turned out that if a party's position was told in the chronological story order the test person more easily followed that party's position in the verdict. If the

³ This section is adapted from Verheij (2000).

prosecution's position was given in chronological story order, while the defence's position was told in random order, the accused was convicted in 78% of the cases. If on the other hand the prosecution's position was given in random order and the defence's in chronological story order, the accused was convicted in 31% of the cases. Crombag, Van Koppen and Wagenaar conclude that telling the story well is half the work.

Crombag, Van Koppen and Wagenaar claim that *story anchoring* is needed in order to justify why a story is taken to be true. For instance, the statement of a policeman that he saw that Peter fired a gun at George, can support that Peter indeed fired a gun at George. By itself, the evidence consisting of the policeman's statement does not prove that Peter fired a gun at George. If the policeman's statement is considered as proof, this is the result of the acceptance of the rule⁴ that policemen tell the truth. Rules need not hold universally; there can be exceptions. No one believes that policemen always tell the truth, but many hold the belief that policemen tell the truth most of the time. According to Crombag, Van Koppen and Wagenaar, there are common-sense generally true rules that underlie the acceptance or rejection of a piece of evidence as proof. They refer to such rules as anchors.

Crombag, Van Koppen and Wagenaar note that different legal systems can not only use different rules as anchors, but even opposites. They give the example of the assessment of confessions. Under English law, a conviction can be based only on the accused's confession, while in Dutch law, additional evidence is required. This suggests that the English use the anchoring rule that confessions are usually true, and the Dutch the opposite rule that confessions are often untrue.

Since the rules used as anchors can have exceptions, it can be necessary to show that a particular exception does not occur. Crombag, Van Koppen and Wagenaar discuss the example of the truthfulness of witnesses (1993, p. 38). Even if one assumes that witnesses normally tell the truth, the rule is not a safe anchor when the witness has a good reason to lie. Additional evidence is required, for instance, the testimony of a second witness. Even if both witnesses are unreliable since they have good reasons to lie, it can be argued that when their testimonies coincide the combined statements suffice as proof. The anchor would then be that lying witnesses do normally not tell the same lies. There is however again an exception: if the two testimonies are not independent, for instance since the witnesses have conferred, the anchoring is again not safe.

In the theory of anchored narratives, stories are hierarchically structured. The main story can consist of sub-stories that on their turn contain sub-sub-stories, and so on. The idea is that each sub-story is a further specification of the story or one of its parts. In each sub-story, a rule is used as an anchor to connect one or more pieces of evidence to the decision of the story or to a part of the decision. A difficulty arises from the fact that the rules used as anchors often remain implicit. Making the naïvely adopted rule explicit can lead us to reject it (1993, p. 38).

If one goes to a deeper level in the story hierarchy, the anchors will become more and more specific, and as such *safer*. For instance, at a high level, the anchoring rule could be that witnesses normally tell the truth, while at a deeper level it could be replaced by the rule that witnesses that have no good reason for lying normally tell the truth.

Figure 1 (adapted from 1992, 1994, p. 72, 1993, p. 39) illustrates the theory of anchored narratives.

⁴ Some would prefer to speak of a generalisation because of the normative, even institutional connotation of the term 'rule'.

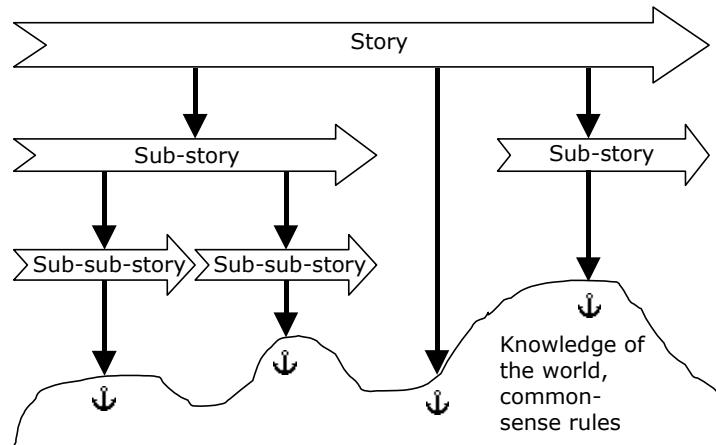


Figure 1: the theory of anchored narratives

The use of rules as anchors gives the theory of anchored narratives a deductive element. A decision follows from the evidence on the basis of a general rule. According to Crombag, Van Koppen and Wagenaar, anchoring is not equal to subsuming under a rule, since rules can have exceptions (1993, p. 58).

Crombag, Van Koppen and Wagenaar use their theory of anchored narratives in order to explain what they call *dubious cases* (or *dubious convictions*). In their terminology, a criminal conviction is dubious if the District Court's verdict was reversed by the Court of Appeals because of a different evaluation of the evidence, or if the defence attorney remained strongly convinced of his client's innocence, even after (repeated) conviction (1993, p. 11). Thirty-five of such dubious cases were obtained from criminal lawyers, or were selected from among the cases in which one of the authors served as an expert witness. Crombag, Van Koppen and Wagenaar claim that their set of cases supports the theory of anchored narratives, since the anomalies that occur in the cases can only be explained by their theory.

As a spin-off of their work on dubious cases, Crombag, Van Koppen and Wagenaar present ten universal rules of evidence (1993, p. 231f.):

1. The prosecution must present at least **one well-shaped narrative**.
2. The prosecution must present **a limited set of well-shaped narratives**.
3. **Essential components** of the narrative must be **anchored**.
4. **Anchors** for different components of the charge **should be independent** of each other.
5. The trier of fact should give **reasons for the decision** by specifying the narrative and the accompanying anchoring.
6. A fact-finder's decision as to **the level of analysis** of the evidence **should be explained through an articulation of the general beliefs used as anchors**.
7. There should be **no competing story** with equally good or better anchoring.
8. There should be **no falsifications of the indictment's narrative** and nested sub-narratives.
9. There should be **no anchoring onto obviously false beliefs**.
10. **The indictment and the verdict should contain the same narrative**.

Obviously, these universal rules of evidence cannot be applied 'as is'. Wagenaar, Van Koppen and Crombag are fully aware of this. For instance, with respect to rule 8, they explain that it is not necessarily clear what counts as a falsification and what not (p. 243-4). For further qualification of these universal rules of evidence, the reader is referred to the original source (1993, p. 231f.).

3 Modelling argumentation

In this section, we will discuss the modelling of argumentation, as relevant for the rest of this paper. The discussion is informed by interdisciplinary research in the fields of argumentation theory, artificial intelligence and law (cf., e.g., Pollock 1995, Prakken 1997, Hage 2005, Walton 2005, Walker 2007). Here we follow the approach by Verheij (2003a, 2003b).⁵ For present purposes, we have skipped formal detail. These can be found in the sources mentioned.

3.1 Toulmin's argument model

Toulmin (1958) introduced a model for the analysis of arguments that was richer than the traditional logical scheme focusing on premises and conclusions. His model has been and remains influential across a variety of disciplines (cf. Hitchcock & Verheij 2006). The model is shown in Figure 2. Datum and claim are analogues of premise and conclusion. Toulmin's original example used "Harry was born in Bermuda" as datum and "Harry is a British subject" as claim. The warrant is a generic inference license underlying the step from datum to claim. In the example: "A man born in Bermuda will generally be a British subject". The backing ("The statutes and other legal provisions so-and-so obtain") provides support for the warrant. The rebuttal is a form of argument attack that allows argumentation against the claim or the support for it (e.g., "Harry has become a naturalized American"). Toulmin also included a qualifier, in order to make explicit that arguments can lead to a qualified conclusion ("Presumably, Harry is a British subject").

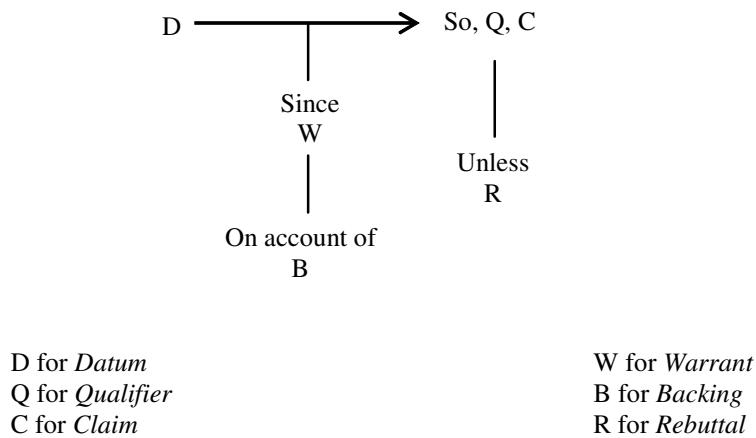


Figure 2: Toulmin's argument model

3.2 Datum & claim

The basic, non-trivial form of argumentation consists of a reason that supports a conclusion. In Toulmin's terminology: a claim is supported by a datum. In the present approach, in order for the claim to follow, two elements are needed: the datum and the connection between the datum and the claim. Figure 3 gives a graphical representation of the three basic situations. On top, there is the situation in which the datum and the connection between datum and claim are assumed (indicated by the thick lines). As a result of these assumptions the claim is positively evaluated (indicated by the bold font).

⁵ This section is adapted from Verheij (2007).

It can occur that the datum is considered a possible reason for the claim, while the datum itself is not assumed (see the middle of Figure 3). In other words, the connection between datum and claim is assumed, but not the datum itself. Then the datum and claim are each neither positively nor negatively evaluated, which is indicated by a regular, black font and a dotted border. When the datum is not assumed, argumentation can naturally proceed by providing a reason for the datum (turning the datum into the claim of a second datum/claim-pair).

The bottom of Figure 3 shows the situation where the datum is assumed, but the connection between datum and claim is not. In that case, the datum is positively evaluated, but the corresponding claim is not.

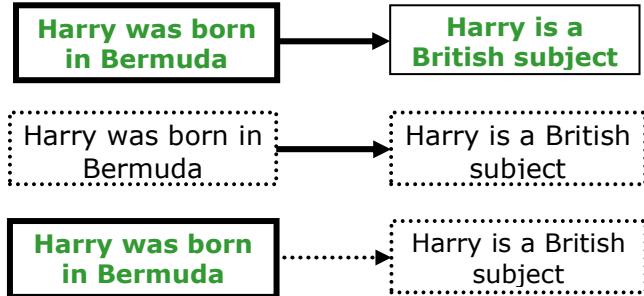


Figure 3: A datum and claim

3.3 Warrant & backing

When the conditional connection between datum and claim is not assumed (as at the bottom of Figure 3), a natural argumentative move is to specify the warrant that gives rise to it. A warrant is a generalized inference license and can as such in ordinary language be phrased as a rule sentence. In this connection, it is important to distinguish between the following three:

- A man born in Bermuda will be a British subject.
- If *Person* was born in Bermuda, then *Person* is a British subject.
- If Harry was born in Bermuda, then he is a British subject.

The first is the warrant, i.e., a generic inference license phrased as a rule sentence. The second is the scheme of specific inference licenses related to it. It is phrased as a conditional sentence with a variable (*Person*). The third is a specific inference license. It is one of the instances of the scheme preceding it. The first two (the warrant and the associated scheme) are in a specific sense equivalent since either expresses the warrant's core meaning as a generic inference license. However obviously only the rule phrase occurs in ordinary language.

Figure 4 (top) shows a warrant that is assumed to hold and hence is positively evaluated. As a result of the warrant, the connection between the original datum and claim follows. When the warrant is not assumed (Figure 4, bottom), the connection between datum and claim does not follow. Consequently, the claim does not follow either and is not positively evaluated.

In such a case, a backing from which the warrant follows can be given as support for the warrant. The result is that the claim becomes positively evaluated again (Figure 5).

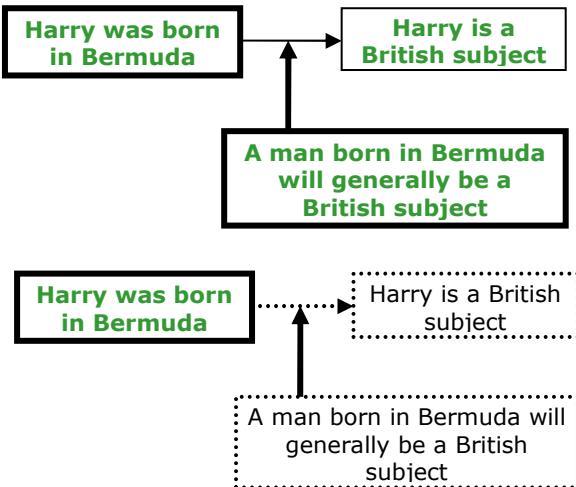


Figure 4: Adding a warrant

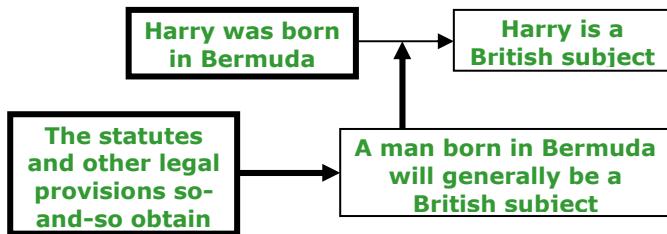


Figure 5: The role of a backing

3.4 Attack

The strongest deviation from classical logical analyses of argument in Toulmin's model is the idea of argument attack, in Toulmin's terminology: rebuttal.⁶ The possibility of attack involves the defeasibility of arguments: an argument that shows why a conclusion follows can by new information (counterreasons, exceptions to a rule, etc.) become overturned. Technically, the effect is nonmonotonicity, i.e., it can occur that conclusions that initially follow are retracted given additional information.

The basic form of attack and its effect on argument evaluation is most easily illustrated in a situation with only a datum and a claim, and no warrant or backing. Figure 6 shows the effect of an attack against the connection between datum and claim. At the top, the attacking reason is not assumed (but its undercutting effect is assumed, as is shown by the thick red arrow with a diamond end); hence the claim is still positively evaluated. At the bottom, the attacking reason is assumed, and therefore blocks the connection between datum and claim. As a result, the claim is no longer positively evaluated.

⁶ Pollock (1995) has distinguished two kinds of argument attack, viz. rebutting and undercutting defeaters. Considering his examples, Toulmin's rebuttals can include both kinds.

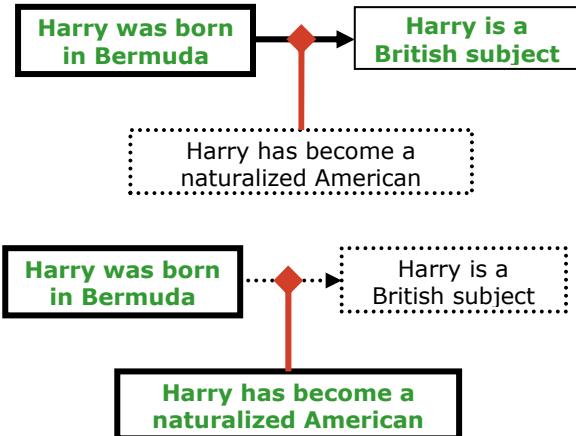


Figure 6: An attacking reason (no warrant)

3.5 *Reinstatement*

An important phenomenon that can occur when argumentation is defeasible is reinstatement. This occurs when a conclusion follows, then by additional information no longer follows, but subsequently - when even more information is added - follows again. For instance, assume an unlawful act case in which someone has broken a window. As a result, it can at first be argued that he has an obligation to pay for the damages because of breaking the window. That conclusion no longer follows when this argument is attacked by a ground of justification, e.g., because the breaking of the window allowed the saving of a child in the burning house. The obligation to pay can become reinstated again in case it turns out that breaking the window was not necessary for saving the child. Figure 7 shows the endpoint of this exchange of reasons and counterreasons.

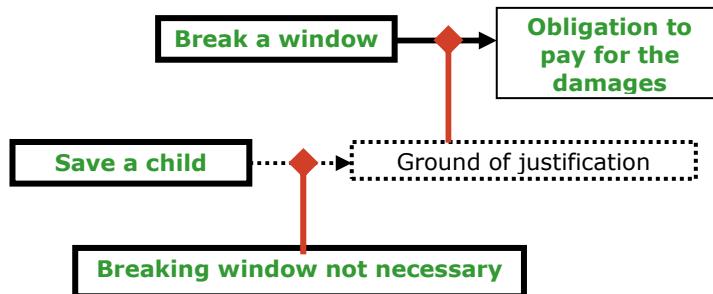


Figure 7: Reinstatement

As a side issue, the example can be used to illustrate the need for 'attack warrants'. In the example, it is debatable whether (in an actual legal system) the non-necessity of the property right violation blocks the inference that saving the child gives rise to a ground of justification. It therefore can be relevant to specify the underlying generic attack license (something like "When a property right violation is not necessary, there is no ground of justification by force majeure"), and give backing for that.

3.6 *Argumentation schemes*

Argumentation schemes can be regarded as a generalization of the rules of inference of formal logic. The notion of argumentation schemes stems from the field of argumentation theory. Walton's (1996) treatment has been influential and provides a useful overview with many examples. There also further references to

the argumentation theory literature can be found. Here are two informal versions of logical rules of inferences:

- (1) P . If P then Q .
Therefore Q .
- (2) All P s are Q s. Some R is not a Q .
Therefore some R is not a P .

The former is a semi-formal version of Modus ponens, the latter is one of the classically studied syllogisms. These two schemes fit in neat formal systems; the former in many logical proof systems, but in particular in standard propositional logic, the latter in the classification of syllogisms. Both are truth-preserving (in the sense that the truth of the schemes' conditions are taken to guarantee the truth of their conclusion) and allow no exceptions. Contrast these with the following two schemes:

- (3) Person E says that P . Person E is an expert with respect to facts like P .
Therefore P .
- (4) Doing act A contributes to goal G . Person P has goal G .
Therefore person P should do act A .

The former is a variant of argumentation from expert opinion, the latter a variant of means-end reasoning. Although these schemes are recognizable as patterns that can occur in actual reasoning and are also - to some extent - reasonable, it is immediately clear that the neatness and safeness of the schemes (1) and (2) does not apply to (3) and (4). There is no clean formal system associated with (3) and (4), nor is one to be expected. They are not truth-preserving. For (3), it suffices to note that an expert can be wrong and, for (4), it is even unclear how to establish the truth of its conclusion. Furthermore, (3) and (4) allow exceptions. For instance, an exception to scheme (3) occurs when an expert has a personal interest in saying that P . For scheme (4) it can be the case that there are other, better ways to achieve goal G , or it may be impossible to do A .

Argumentation schemes are context-dependent, defeasible and concrete instead of universal, strict and abstract. To some, these properties may seem to make argumentation schemes a useless tool of analysis, but it turns out that the properties are in fact what makes argumentation schemes useful. At the same time, argumentation schemes require a way of approaching the analysis of reasoning different from one in terms of neat logical systems. And although a full formalistic approach is not feasible given the nature of argumentation schemes, it is not necessary to proceed without any systematicity. As argued by Verheij (2003b), it is possible to approach argumentation schemes in a way that resembles the practice of knowledge engineering, in which knowledge is extracted from domain experts and represented in such a way that a machine can process it. Argumentation schemes can be characterized using a format with four elements: consequent, antecedent, exceptions and conditions of use.

Here is an example of the format for simple arguments based on expert testimony:

Consequent: P .
Antecedent: Person E says that P .
Person E is an expert with respect to facts like P .
Exception: Person E is lying.

Condition: Experts with respect to the facts like P provide reliable information concerning the truth of P .

The format seems to abstract completely from the dialogue setting of argumentation. For instance, the format does not have a slot for critical questions, although in the literature on argumentation schemes these play a central role. The reason for this is that in our opinion the critical questions can be determined on the basis of the format. In fact, the format suggests the following four kinds of critical questions:

1. Critical questions concerning the consequent of an argumentation scheme.
In the example: Are there other reasons, based on other argumentation schemes for or against P ?
2. Critical questions concerning the elements of the antecedent of an argumentation scheme.
In the example: Did person E say that P ? Is person E an expert with respect to facts like E ?
3. Critical questions based on the exceptions of an argumentation scheme.
In the example: Is person E lying?
4. Critical questions based on the conditions of use of an argumentation scheme.
In the example: Do experts with respect to the facts like P provide reliable information concerning the truth of P ?

This classification of critical questions shows that the proposed argumentation scheme format can provide relevant insights for the dialogue setting of argumentation. In a similar way, the format can be applied to the topic of burden of proof. For instance, the proponent of a claim that P will have the burden to answer questions by an opponent concerning the elements of the antecedent, whereas an opponent will have to substantiate an exception. With respect to the consequent, it is natural that a proponent of P has the burden of giving additional reasons for it, whereas the opponent has the burden of giving reasons against it. Prakken and Sartor (2008) and Gordon, Walton and Prakken (2007) provide further discussion of burden of proof in relation with argumentation schemes.

For present purposes, the format is relevant because it provides a natural, systematic approach to develop a set of argumentation schemes with respect to a certain topic. It consists of the following four-steps:

1. Determine the relevant types of sentences
2. Determine the conditional relations, i.e., the antecedents and consequents of the argumentation schemes
3. Determine the exceptions, i.e., the arguments against the use of the argumentation schemes
4. Determine the conditions of use for the argumentation schemes

The four steps need not be followed in this order. It even often occurs that goes back to an earlier step and makes adaptations, until finally a set of argumentation schemes is reached that serves one's purposes. This will be illustrated by the application of the method to the anchored narratives theory in the next section.

4 Argumentation schemes for the anchored narratives theory

In the following, the theory of anchored narratives (referred to as ANT from now on) will be reconstructed in terms of argumentation schemes. As was said in the introduction, Crombag, van Koppen and Wagenaar's theory met with some amount

of criticism from evidence theorists. We suggested that this criticism could in part be repaired by adding precision and detail to the use of terminology and by further development of a number of key concepts in the theory. For example, Figure 1 which plays a central expository role in ANT, suggests that in ANT stories are only anchored in general commonsense knowledge of the world, without a clear role for the pieces of evidence themselves. During our research, we found that over the years the original version of ANT has been subject to changes and interpretations, both by other researchers in the field as well as by its original authors. For our reconstruction of ANT we have drawn from numerous written sources (Crombag et al. 1992, 1994, Wagenaar et al. 1993, De Poot et al. 2004, Wagenaar & Crombag 2006) and from personal discussions with one of the original authors, Peter van Koppen, in the context of the project 'Making sense of evidence' (Bex, Van den Braak et al. 2007).

For expository reasons, the reconstruction will be performed step-by-step and contains a number of retracings in the form of adaptations of results attained at earlier steps. For ease of reference, the final set of argumentation schemes that in our view best expresses ANT has therefore been listed in the appendix.

4.1 Accepting the truth of a true story

The first step in the argumentation scheme method is to determine the relevant types of sentences. In ANT, accepting a story as the true account of the facts involves story quality and story anchoring. So here is a first shot at relevant sentence types:

Story S is true.
Story S is good.
Story S is anchored.

The second step of the method is formulating argumentation schemes, i.e., the conditional relations that exist between the sentence types. For these sentences, this is straightforward: the latter two taken together, when accepted as true, can give support for accepting the truth of the former. Hence, an initial formulation of ANT's central argumentation scheme is this:

- (1) ANCHORED NARRATIVES: ACCEPTING A STORY AS TRUE
 Consequent: Story S is true.
 Antecedent: Story S is good.
 Story S is anchored.

The scheme makes a fundamental distinction underlying ANT explicit: everything that has to do with the evidential support of a story is dealt with under the heading of anchoring, whereas story quality is related to the overall shape and completeness of the story. In ANT, story quality is a kind of pre-evidential plausibility of a story. It is important and characteristic for ANT that story quality is considered to be independent of the available evidence.

It should be noted that - although the scheme's consequent refers to the truth of story S - the scheme is not intended to guarantee that its consequent obtains when its antecedent does. Clearly, it doesn't, for the truth of a story cannot be ensured by its quality (goodness) and anchoring. This is in line with the nature of argumentation schemes, which point to defeasible reasons and make no claim to truth-preservation. The scheme purports to show how according to ANT the truth of a story can be reasonably accepted as true. ANT is pragmatic in this respect, and treats reasoning on the basis of evidence as a kind of pragmatic judgment, not as a guarantee of truth. In ANT, quality and anchoring provide a reason for accepting a

story as being true. In addition, it is relevant to note that, in ANT, this scheme is the only route to accepting the truth of a story.

How can the acceptance of the truth of a story be undermined in ANT? There are three ways of doing that. First, one can argue that the story is not good, second that it is not anchored, and third that there is an exception to the application of the scheme. Before we continue with the former two in our reconstruction of ANT's treatment of story quality and anchoring (in the following two subsections), we turn to the possibility of exceptions to the application of the scheme (cf. step 3 of the method). When there is an exception, the scheme's conclusion doesn't follow, even though the scheme's antecedent is fulfilled. So the question is: when a story is good and anchored, which exceptional situations can - according to ANT - have the effect that it is nevertheless unreasonable to accept the story's truth?

In ANT, one central exception to the scheme is recognized: the occurrence of another story with equally good or better anchoring. This exception corresponds to number 7 of the universal rules of evidence. Including this exception in the scheme leads to the following adaptation:

- (1') ANCHORED NARRATIVES: ACCEPTING A STORY AS TRUE
- Consequent: Story S about topic T is true.
- Antecedent: Story S is good.
Story S is anchored.
- Exception: Story S' about topic T (unequal to S) has equally good or better anchoring.

Looking at this formulation of the scheme leads to a suggestion for refinement: it seems natural to assume that the requirement of goodness should hold both for stories taken to be true and for their competitors. In other words, the suggestion is that alternative stories that are better or equally anchored, but that are not themselves good, are not genuine competitors. Otherwise a rambling, ambiguous story full of contradictions could preclude that an otherwise good and anchored story is taken to be true.

Incorporating this idea in the scheme, we get:

- (1'') ANCHORED NARRATIVES: ACCEPTING A STORY AS TRUE
- Consequent: Story S about topic T is true.
- Antecedent: Story S is good.
Story S is anchored.
- Exception: Story S' about topic T (unequal to S) is good, and
Story S' (unequal to S) has equally good or better anchoring.

We discuss the adaptation (1'') here merely as a suggestion. We have modelled scheme 1'' in such a way that a story need not be better to push out a good story: it suffices that story S' is good and has equally good anchoring. It is conceivable that version (1') is closer to the original intention of Crombag, Van Koppen and Wagenaar (but note the phrasing of universal rule of evidence no. 7). One reason for preferring (1') could for instance be that even a bad, but better anchored story might give sufficient doubt to reject an otherwise good story. Note however that this may depend on the party that presents a story: stories by the prosecutor may need a treatment different from those by the defendant. Here it is not a goal to settle this issue. It is noteworthy however that the issue has naturally presented itself as a side effect of the argumentation scheme method.

4.2 Story quality

Let us continue on the issue of story quality: how is story quality established in ANT? A number of themes occur regularly in this respect. Following our method, we express them in terms of sentence types:

- Story S has a central action to which all elements are related.
- Story S explains how the central action was performed.
- Story S explains why the central action was performed.
- Story S is unambiguous.
- Story S contains the accused's motive.
- Story S tells that the accused had the opportunity to commit the crime.
- Story S does not contain contradictions.

In general, the central action of a prosecutor's story is the crime itself, though there are examples discussed in ANT's main sources, in which the crime is not itself the central action in the story that is the issue of the debate.⁷ Hence the accused's motive (the fifth sentence type in the list above) is just one instance of a reason why the central action was performed (the third sentence type). It therefore seems reasonable that, in a generic scheme, the motive is left out. Similarly, opportunity (the sixth type) can be taken as an instance of the general constraint of internal coherence of the story (the seventh type). A first version of an argumentation scheme capturing these points is the following:

- (2) ANCHORED NARRATIVES: STORY QUALITY
- Consequent: Story S is good.
 - Antecedent: Story S has a central action to which all elements are related.
 - Story S explains how the central action was performed.
 - Story S explains why the central action was performed.
 - Story S is unambiguous.
 - Story S does not contain contradictions.

In section 4.4, we will have more to say about the scheme of story quality (which will lead to refinements), but first we continue with the second central theme of ANT, viz. story anchoring.

4.3 Story anchoring

It is especially in the part of story anchoring that ANT has occasionally led to misunderstandings: why consider commonsense generalizations as anchors and not the pieces of evidence themselves? Isn't providing good evidence the most important way of justifying one's belief in the truth of a story? Certainly, and presumably Crombag, Van Koppen and Wagenaar don't disagree, or at least not radically. Clearly they have not defended that believing a story is just a matter of the right ("safest") commonsense generalizations, while leaving aside the pieces of evidence. Instead, what they have argued for, is that the value of a piece of

⁷ For instance, in the Haaknat case (discussed by Crombag et al. 1992, 1994 and Wagenaar et al. 1993) the crime was a robbery, but the point at issue was why Haaknat was found hiding for the police in a moat. Was Haaknat hiding because of his involvement in a fight (as he himself claimed) or was it because of the robbery? From the perspective of the crime, Haaknat's hiding is not a central action, but from the perspective of the decision making it was. In this way, if the identity of the perpetrator is at issue, the actual crime is always one of the possible stories that explains some kind of (strange) behaviour by the suspect.

evidence as proof for the occurrence of an event cannot be estimated independent of the commonsense generalization that connects the piece of evidence to the event. For example, a story can only be reasonably believed on the basis of a confession *if confessions normally contain true stories*. Moreover, ANT emphasizes that the value of a piece of evidence is a function of the safeness of the corresponding anchoring generalization. For instance, if the proof criterion is "beyond a reasonable doubt" (and not merely "reasonable"), the generalization "*if confessions normally contain true stories*" does not seem to suffice. Then something stronger like "*confessions almost always contain true stories*" should be true. One reason why ANT's authors elaborate at length on the importance of anchoring generalizations is that their safe use can require consultation of experts, for instance on the empirical findings about the safeness of witness testimony.

In a benevolent reading of ANT, there is no serious misconception with respect to the relation between the justification of belief in a story, pieces of evidence and the commonsense generalizations connecting them. ANT's use of the metaphor of anchors is not incoherent. Perhaps the specific version of the metaphor is somewhat infelicitous, given the following observation: when discussing ANT, we have repeatedly encountered that people tend to think of the pieces of evidence as anchors, and that it takes effort to instead think of the generalizations as anchors. A slight change of the use of the metaphor seems in place: perhaps the generalizations should be thought of as the anchor *chains*. This adaptation of the metaphor does justice to the idea that the generalizations connect the piece of evidence (in the metaphor: the anchor) to the story (the 'ship').

Let us continue with determining how the anchoring of a story can be dealt with in our argumentation scheme reconstruction of ANT. A central type of sentence in anchoring is the following. It is phrased in such a way that it avoids the pitfalls of the different interpretations of the anchors metaphor just described:

- (*) Component C of story S is anchored to piece of evidence E by anchoring generalization G.

Different phrasings of the same idea, less tied to ANT's preferred choice of words, are of course possible, e.g.:

- (†) Component C of story S finds support in piece of evidence E on the basis of warranting generalization G.

Here the term "warranting" is related to Toulmin's (1958) warrants, viz. generic inference licenses (discussed in section 3). In certain circumstances, it can be worthwhile to split (†) into two parts, as follows:

Component C of story S finds support in piece of evidence E.
The support of component C of story S by piece of evidence E is warranted by generalization G.

As we are reconstructing ANT, we will stay close to its terminology and use (*). It is tempting to propose the following argumentation scheme:

- (3) ANCHORED NARRATIVES: ANCHORING
 - Consequent: Story S is anchored.
 - Antecedent: There is a piece of evidence E.
 - Component C of story S is anchored to piece of evidence E by anchoring generalization G.
 - Anchoring generalization G is safe.

Indeed (3) expresses the core idea underlying ANT that anchoring a story involves that some component of the story S is supported by a piece of evidence E, when a safe generalization connects E and C. However, the present scheme suggests that for a story's anchoring it suffices that *one* component is supported by evidence. This is in general not correct: in a murder case it does not suffice to have evidence for the victim being killed (although a murder case without a body is in trouble), while there is nothing to support who did the killing. On the other hand, it is also not necessary (nor in general feasible) that *all* components of a story are directly supported by evidence. For instance, sometimes even a murder case without a body can lead to a life sentence for the murderer (Court of Appeal Leeuwarden, July 19, 2006; the victim had been burnt). ANT takes a middle way: not one, not all, but the *essential* components of a story must be supported by evidence (universal rule of evidence no. 3).

One way of capturing these ideas in an argumentation scheme is in terms of the specification of a reason *against* a story's anchoring: a story is *not* well-anchored when there is an essential component that is not safely anchored.⁸ A story component is safely anchored when it is anchored to a piece of evidence and a corresponding safe generalization. Scheme 3 is split into two:

- (3a) ANCHORED NARRATIVES: ATTACKING THE ANCHORING OF A STORY
 - Consequent: Story S is not well-anchored.
 - Antecedent: Component C of story S is essential.
 - Component C of story S is not safely anchored.

- (3b) ANCHORED NARRATIVES: COMPONENT ANCHORING
 - Consequent: Component C of story S is safely anchored.
 - Antecedent: There is a piece of evidence E.
 - Component C of story S is anchored to piece of evidence E by anchoring generalization G.
 - Anchoring generalization G is safe.

Four differences with the original scheme (3) are worth mentioning. First the scheme's direction of support has flipped: instead of a scheme that expresses how to support a story's anchoring, it is now replaced by scheme (3a) expressing how to attack a story's anchoring. Second it now is made explicit that a subset of story elements needs support by evidence, namely the essential components. Third the choice of words in the consequent is now more normatively loaded: instead of simply speaking of anchoring, we now speak of well-anchoring. In this way, it is clearer that story anchoring is a matter of degree and of judgment. This also leads to a slight adaptation of scheme (1''). The requirement for accepting a story as true now becomes that a story is well-anchored, instead of merely being anchored:

- (1'') ANCHORED NARRATIVES: ACCEPTING A STORY AS TRUE
 - Consequent: Story S about topic T is true.
 - Antecedent: Story S is good.
 - Story S is well-anchored.
 - Exception: Story S' about topic T (unequal to S) is good, and
 - Story S' (unequal to S) has equally good or better anchoring.

Fourth, we have now two kinds of anchoring: the anchoring of stories (scheme (3a)) and the anchoring of story components (scheme (3b)).

⁸ Another way is the use of a universal quantifier: supporting a story's well-anchoring requires that *all* essential components are safely anchored.

There is no general method for determining the safeness of anchoring generalizations. It is for instance always possible to argue that the case under consideration is an exception. ANT gives some advice, though. Specificity is relevant for determining safeness in the sense that it is easier to decide about a rule's correctness when it is more specific, but specificity cannot warrant correctness (Wagenaar et al. 1993, p. 40). ANT has one general attack against the safety of anchoring generalizations, viz. their obvious falsity (cf. universal rule of evidence no. 7):

- (4) ANCHORED NARRATIVES: OBVIOUSLY FALSE GENERALIZATIONS
 Consequent: Anchoring generalization G is not safe.
 Antecedent: Anchoring generalization G is obviously false.

Scheme (3a) is the attack of a story being well-anchored that is most characteristic for ANT: only stories of which the essential components are safely anchored are well-anchored. Besides this attack, ANT has two other attacks of a story being well-anchored. One is based on the interdependence of anchoring (scheme (5) below based on universal rule of evidence no. 4), the other on the falsification of a story (scheme (6) below based on universal rule of evidence no. 8):

- (5) ANCHORED NARRATIVES: ATTACK BY INTERDEPENDENCE OF ANCHORING
 Consequent: Story S is not well-anchored.
 Antecedent: The anchoring of (unequal) components C and C' is interdependent.
 Component C of story S is essential.
 Component C' of story S is essential.

Interdependent anchoring for instance occurs when the case against a suspect (including identity, actus reus and mens rea) is based only on his confession or only on the testimony by the victim.

- (6) ANCHORED NARRATIVES: ATTACK BY FALSIFICATION
 Consequent: Story S is not well-anchored.
 Antecedent: Story S is falsified.

There does not seem to be an explicit description of what story falsification amounts to in ANT. The following scheme suggests one approach:

- (7) ANCHORED NARRATIVES: FALSIFICATION
 Consequent: Story S is falsified.
 Antecedent: Component C of story S is essential.
 The opposite of component C of story S is anchored to piece of evidence E by anchoring generalization G.
 Anchoring generalization G is safe.

It may be worthwhile to emphasize one difference between the antecedents of (7) and (3a): whereas (3a)'s antecedent involves an essential component that *is not* safely anchored, in (7)'s antecedent the *opposite* of an essential component *is* safely anchored.

4.4 Recursiveness of stories in reasoning about evidence

We now turn to an issue related to ANT that we did not learn directly by reading its main sources, but by conversations with one of its authors: Peter van Koppen. The conversations took place in the context of the already mentioned project 'Making

sense of evidence'. Van Koppen emphasized again and again that not only the facts of a crime are stories, but also the pieces of evidence that support or attack the truth of a story themselves.⁹ For us, Van Koppen's position was rather surprising as we tended to think of pieces of evidence as giving rise to the reasons that support or attack crime stories. So in our minds there was a dichotomy between reasons and stories, a dichotomy that did not seem to exist (or at least not in the same way) in Van Koppen's conceptualisation.

The point is related to the issue of real evidence, in Wigmore's terminology: 'autoptic preference'. With real evidence, no inference is required; the thing itself is its proof. For example, to prove that there is a knife by means of autoptic preference, one only has to show the knife itself. There is however a problem with the idea that the thing proves itself: it *only* proves itself. Peter Tillers wrote an interesting piece about this in his web log.¹⁰ Showing a knife and saying 'there is a knife' may prove that there is a knife, but it could just as well be the knife the judge used to cut his steak with the day before. What has to be proved, that the knife was used in a brutal murder, cannot be proved by just the knife itself. We need forensic expertise on fingerprints, police reports about where the knife was found and so on. In other words, it has to be shown why and how the knife is part of the evidence for the event that a person was brutally murdered with the knife.

Van Koppen's position can be regarded as an answer to this problem of real evidence. On one occasion, he argued that finding a hair on the crime scene that matches the accused's DNA does not mean that the accused committed the crime; a good and properly anchored story has to be constructed that tells us that the hair was in fact left on the scene of the crime at the moment that the accused committed the crime.

However, Van Koppen's position that a piece of evidence *is* a story provides a theoretical complication: are pieces of evidence not first and foremost (sources for) reasons that support or attack crime stories? What happens to this idea when pieces of evidence are to be regarded as stories? Are then piece-of-evidence stories supportive for facts-of-the-crime stories? Are piece-of-evidence stories of "the same kind" as facts-of-the-crime stories? Are they to be evaluated in the same way? And so on.

In this section, an approach to the resolution of this theoretical complication is proposed. The provided solution leads to the main clarification (perhaps: adaptation) of ANT resulting from our reconstruction, while retaining ANT's spirit.¹¹ The approach is based on recursiveness. In argumentation, one version of recursiveness meets the eye immediately. It is the recursiveness of reasons. To defend (or attack) a claim, one gives reasons, but for these reasons on their turn reasons can be given, and so on. Recursiveness of reasons occurs in any kind of argumentation, hence also in the context of evidential argumentation (see, e.g., Anderson et al. 2005 and our own previous work Bex, Van den Braak et al. 2007).

However, in our reconstruction of ANT another kind of recursiveness is used, one that fits Van Koppen's position that pieces of evidence are stories. This recursiveness is the recursiveness of stories in reasoning about evidence:¹² to

⁹ This theoretical position nicely fits Van Koppen's conversation style: he is a gifted teller of stories.

¹⁰ 'The Chain Saw Did Not Speak Clearly', June 09, 2005, tillerstillers.blogspot.com/2005/06/chain-saw-did-not-speak-clearly.html. Page accessed on March 31, 2008.

¹¹ It is our hunch that the authors of ANT will not consider what will follow to be a genuine adaptation, but at best a clarification. If so, the reconstruction has succeeded.

¹² This kind of recursiveness of stories is different from the recursiveness of story schemes mentioned by (Bex 2008). There, the events of a sub-story are essentially

establish the truth of a facts-of-the crime story, its essential components must be safely anchored (to a piece of evidence by an anchoring generalization; cf. scheme (3') above). But for this component anchoring, *a story about a piece of evidence must be provided*, and this story must be accepted as true. The recursion arises since accepting the truth of a piece-of-evidence story is analogous to accepting the truth of a facts-of-the-crime story: like a facts-of-the-crime story, a piece-of-evidence story is accepted as true when it is good and well-anchored, and there is no competing story (cf. scheme (1'')). The recursion can continue, since arguing for the truth of a piece-of-evidence story can involve further piece-of-evidence stories, and so on.

If we apply this idea of the recursiveness of stories in our reconstruction of ANT, scheme (3b) about component anchoring only needs a slight adaptation:

(3b') ANCHORED NARRATIVES: COMPONENT ANCHORING

Consequent: Component C of story S is safely anchored.

Antecedent: There is a piece of evidence E.

Story SE about piece of evidence E is true.

Component C of story S is anchored to piece of evidence E by anchoring generalization G.

Anchoring generalization G is safe.

We simply added a conjunct to the scheme's antecedent, viz. 'Story SE about piece of evidence E is true'. Note that the scheme now refers to two stories: a story S and a story SE about a piece of evidence used to support a component of story S. The story S can be about the facts of a crime, or, recursively, about a piece of evidence. The effect of this adaptation is that the truth of stories about pieces of evidence is now treated on a par with other stories, viz. by story quality and by story anchoring.

As an illustration, we return to the example of a hair found on the scene of the crime, and use it to establish whether the accused was at the scene of the crime. Initially, there is a very simple story about the hair, so simple that the term 'story' is somewhat unbefitting:

A hair is found on the scene of the crime and the hair's DNA matches that of the accused.

If this story would be used to defend that the accused was at the scene of the crime, the following anchoring generalization is needed:

If a hair is found on the scene of the crime and the hair's DNA matches that of the accused, then the accused was at the scene of the crime.

The defence could for instance argue that this generalization is not sufficiently safe to conclude (using (3b')) that the story component 'The accused was at the scene of the crime' is safely anchored.

Let's next consider the more complicated situation of the frustrated investigator. Here is the story:

A hair is found on the scene of the crime and the hair's DNA matches that of the accused. The hair was planted on the scene of the crime by a frustrated investigator.

a subset of the main story, while here one story (typically about a piece of evidence) plays a role in accepting another (typically about the facts of the crime).

If we were to use this story for anchoring, we would need the following anchoring generalization:

If a hair is found on the scene of the crime and the hair's DNA matches that of the accused *and it is planted there*, then the accused was at the scene of the crime.

This generalization is obviously false, and scheme (4) could be used to attack its use for safe anchoring. As a result, applying scheme (3b') to the planted hair does not lead to the safe anchoring of the story component that the accused was at the scene of the crime.

One may wonder whether (3b') isn't an unnecessarily involved version of (3b). Why treat pieces of evidence as stories in the first place? Can't they be treated as elementary propositions (as is in a way the case in (3b))? The answer is: that depends on the circumstances, but in this respect the situation for the facts of the crime is analogous to that of pieces of evidence. For *simple* stories, either about the facts of the crime or about pieces of evidence, a story approach as in ANT, in which story quality and story anchoring are established, is indeed often overly involved. Then an approach with propositions and reasons (e.g., styled as in section 3) suffices. As soon as a story gets more complex, or establishing its truth becomes more involved, a story approach as in ANT can come in useful. This can for instance occur when there are several good, hence plausible, but competing stories, or when discussion is possible about the plausibility of a story or about one of the generalizations used. A defence of a story-based approach against (or in comparison with) a reason-based approach is however beyond the goals of the present paper (see, e.g., Twining's (1999) reflections that are very relevant in this respect).

4.5 Other story structures

Looking back at the schemes proposed, after having introduced the recursiveness of stories, it turns out that with hindsight one scheme requires adaptation, namely scheme (2). In fact, the specifics of scheme (2) may be a reason why the recursiveness of stories underlying ANT was not so readily clear: scheme (2) is about stories that involve an intentional crime, and stories about pieces of evidence are not in general about intentional crime. It is noteworthy that scheme (2) is already somewhat more general than the main descriptions of ANT since scheme (2) is in fact a scheme about intentional action in general, and not just about intentional crime.

Our example illustrates the problem: the simple story about the hair does not contain an intentional action, whereas the extended story does. Although the more complex story involves intentional action, this is not in general the case for more complex piece-of-evidence stories. For instance, there is no intentional action in the situation that the accused's hair was accidentally dragged to the scene of the crime (e.g., the accused, living in the same street as the scene of the crime, has lost a hair on the street, which subsequently got stuck to the victim's shoe, etc.). In sum, there are other stories than those about intentional action, of which it can be relevant to establish truth in terms of story quality (hence plausibility) and anchoring.

The reason why intentional action was so explicitly built into scheme (2) is that intentional action is so explicitly built into ANT. In ANT, story quality is connected to story structures (also called story grammars), and these in turn are connected to intentional action, at least in the main sources of inspiration for ANT (Bennett & Feldman and Pennington & Hastie). For stories about the facts of intentional crime, this is a wholly natural approach. For other stories that are

relevant in reasoning about evidence, such as stories about unintentional crime (e.g., criminally negligent homicide) or about pieces of evidence, this is not so clear.

What is needed is a way to incorporate other story structures than one for intentional action or crime in ANT's main approach. Here is a proposal to adapt scheme (2) to allow different story structures:

- (2') ANCHORED NARRATIVES: STORY QUALITY
- Consequent: Story S is good.
Antecedent: Story S fits story structure G .
Story S is unambiguous.
Story S does not contain contradictions.

In this scheme, we have deleted all references to intentional crime. Instead, the existence of a fitting story structure (such as one for intentional crime) has been given an explicit place. We have done this as it seems reasonable that different kinds of stories have different story structures. For instance, it is to be expected that a murder story has a story structure different from a story about a hair on the scene of the crime. One could say that different story structures represent "factual types". For instance, a murder story S belongs to the factual type of murders. A hair on the scene of the crime belongs to the factual type of forensic evidence, or perhaps even of hairs on the scene of the crime.

We will not develop a theory of factual types and their story structures here. We will suggest, however, how the story structure for intentional action (the one used in ANT) can be integrated into our argumentation scheme reconstruction. A further scheme is needed that specifies the elements of a story type:

- (8) ANCHORED NARRATIVES: FITTING THE STORY STRUCTURE OF INTENTIONAL CRIME
- Consequent: Story S fits story structure G.
Antecedent: Story structure G requires a central action to which all elements are related.
Story structure G requires an explanation of how the central action was performed.
Story structure G requires an explanation of why the central action was performed.
Story S has a central action to which all elements are related.
Story S explains how the central action was performed.
Story S explains why the central action was performed.

Bex (2008) describes further work on fitting story structures.

5 Concluding remarks

The present reconstruction of ANT relates to our previous work on reasoning with evidence (Bex, Prakken et al. 2007, Bex, Van den Braak et al. 2007), as follows. In the previous work, stories are modelled as causal networks that explain the central event. Pieces of evidence are connected to the events in the story using defeasible arguments, thus creating a formal framework for an argumentative story-based analysis of evidence. Several features of ANT also occur in this formal framework. Component anchoring and attacking a story's anchoring, here schemes (3a), (3b') and (4), are modelled using defeasible arguments, where an event or component of a story is anchored if it follows from an undefeated argument based on a piece of evidence. Story falsification, schemes (6) and (7), is also modelled, as the opposite of a story component can be the conclusion of an argument based on a piece of evidence. Furthermore, the causal networks that model stories are not allowed to

contain contradictions and implausible or unambiguous causal links can be defeated by arguments, thus ensuring that a story does not contain contradictions and that it is unambiguous (scheme (2')). Stories can be compared by looking at how many components of a story are anchored in evidence (cf. the exception of scheme (1'')).

Anderson et al. (2005) also discuss stories in the context of reasoning with evidence. They give a protocol for analysing the plausibility, coherence and evidential support of stories. This protocol consists of a list of questions. Some point to the evidential support for the story, for example, 'To what extent does the evidence support the story?' and 'Is there evidence that conflicts with the story?' Other questions are meant for analysing the plausibility of the story, for example, 'Is the story supported by plausible background generalizations?' and 'Does the story fit a familiar story such as Cinderella and what is the relevance of this?'

In this text we have developed a reconstruction of the theory of anchored narratives (ANT) in terms of argumentation schemes. The schemes are listed in the appendix. Our contribution can be summarized as follows.

- ANT's central metaphor of stories anchored by generalisations that connect pieces of evidence with story components can be confusing, especially since many intuitively think of the pieces of evidence as anchors, and not the generalisations. Still ANT's message that justifying one's belief in a story is a function of the safeness of the generalizations used is sound. Our reconstruction has shown one way to bypass the confusion.
- Our reconstruction in terms of argumentation schemes shows how ANT's story-based approach can be treated in a context of argumentation, while retaining the emphasis on stories as wholes. It provides an integration of argumentation and stories different from the one by Bex et al (2007). There we discussed the use of stories in terms of causal networks and abductive reasoning. The emphasis was on formalized defeasible arguments about elements of stories. In contrast, here the focus is on semi-formal argumentation schemes in which the role of stories (as wholes) is made explicit.
- On the basis of the reconstruction we proposed some refinements and clarifications of ANT. A minor one is incorporated in scheme (1''). We suggested that only good, i.e., plausible, stories with equal or better anchoring can exclude one's acceptance of a story.
- A further clarification is more fundamental: it is the recursive use of stories. Not only the acceptance of stories about the facts of the crime, but also about other factual situations, such as those about a piece of evidence, can be treated in ANT. The clarification is incorporated in scheme (3b'), in which the safe anchoring of a story component requires a story about a supporting piece of evidence. In section 4.4, it is explained that such extended, recursive use of stories is natural, but may be too complex for simple cases.
- The recursive use of stories led to a further relevant refinement, namely the need for other story structures than only a story structure for intentional crime. When stories cannot only be about the facts of a case of intentional crime, but also about the facts of unintentional crime and pieces of evidence, then different story structures are needed in order to establish their plausibility, or, in ANT's preferred terminology: quality. This refinement is specified in scheme (2').

In sum, we conclude that an argumentation schemes reconstruction of the theory of anchored narratives is possible, and that the exercise leads to a number of relevant clarifications and refinements.

The result helps to clarify the criticisms against ANT mentioned in the introduction: The notions of stories and arguments have been given a clear and

separate role when considering the truth of a story about the facts. There is a definite distinction between reasons based on pieces of evidence and stories about pieces of evidence. The relation between common-sense generalisations and pieces of evidence and the way in which they help (and don't help) accepting or rejecting facts and stories as true has been clarified. ANT's universal rules of evidence have shown their usefulness for developing the set of argumentation schemes. A place has been found for on the one hand commonsense generic beliefs (viz. ANT's anchoring generalisations) and on the other commonsense knowledge of scenarios (viz. story structures for different factual types).

As theoretical contribution, we have provided an account of reasoning about the facts in which not only the elements of stories are part of argumentation, but also stories as wholes. We have argued that accepting the truth of a story can depend on accepting the truth of other stories (cf. the recursiveness of stories; section 4.4) and that story structures different from one for intentional crime are needed (section 4.5).

We conclude that the explicit nature of the set of argumentation schemes (cf. the list in the appendix) can be the basis for further discussion about the theory of anchored narratives in relation to other approaches towards reasoning about the facts of criminal cases, and for the future development of our knowledge about how such reasoning can and should be done as well as possible. The topic deserves our ongoing attention, since the task of the rational choosing of truth, facing our courts, is both necessary and dangerous.¹³

Appendix: the set of argumentation schemes

- (1'') ANCHORED NARRATIVES: ACCEPTING A STORY AS TRUE
 - Consequent: Story S about topic T is true.
 - Antecedent: Story S is good.
 - Story S is well-anchored.
 - Exception: Story S' about topic T (unequal to S) is good.
 - Story S' (unequal to S) has equally good or better anchoring.
- (2') ANCHORED NARRATIVES: STORY QUALITY
 - Consequent: Story S is good.
 - Antecedent: Story S fits story structure G .
 - Story S is unambiguous.
 - Story S does not contain contradictions.
- (3a) ANCHORED NARRATIVES: ATTACKING THE ANCHORING OF A STORY
 - Consequent: Story S is not well-anchored.
 - Antecedent: Component C of story S is essential.
 - Component C of story S is not safely anchored.
- (3b') ANCHORED NARRATIVES: COMPONENT ANCHORING
 - Consequent: Component C of story S is safely anchored.
 - Antecedent: There is a piece of evidence E.
 - Story SE about piece of evidence E is true.
 - Component C of story S is anchored to piece of evidence E by anchoring generalization G.
 - Anchoring generalization G is safe.
- (4) ANCHORED NARRATIVES: OBVIOUSLY FALSE GENERALIZATIONS
 - Consequent: Anchoring generalization G is not safe.

¹³ Cf. Twining (1999).

- Antecedent: Anchoring generalization G is obviously false.
- (5) ANCHORED NARRATIVES: ATTACK BY INTERDEPENDENCE OF ANCHORING
Consequent: Story S is not well-anchored.
Antecedent: The anchoring of (unequal) components C and C' is interdependent.
Component C of story S is essential.
Component C' of story S is essential.
- (6) ANCHORED NARRATIVES: ATTACK BY FALSIFICATION
Consequent: Story S is not well-anchored.
Antecedent: Story S is falsified.
- (7) ANCHORED NARRATIVES: FALSIFICATION
Consequent: Story S is falsified.
Antecedent: Component C of story S is essential.
The opposite of component C of story S is anchored to piece of evidence E by anchoring generalization G.
Anchoring generalization G is safe.
- (8) ANCHORED NARRATIVES: FITTING THE STORY STRUCTURE OF INTENTIONAL CRIME
Consequent: Story S fits story structure G.
Antecedent: Story structure G requires a central action to which all elements are related.
Story structure G requires an explanation of how the central action was performed.
Story structure G requires an explanation of why the central action was performed.
Story S has a central action to which all elements are related.
Story S explains how the central action was performed.
Story S explains why the central action was performed.

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