# Persuasive Precedents

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**Abstract**

Stories can be a powerful vehicle of persuasion. We typically use stories to link known events into coherent wholes. One way to establish coherence is to appeal to past examples, real or fictitious. These examples can be chosen and critiqued using legal case-based reasoning (CBR) techniques. In this paper, we apply these techniques to factual stories, assessing a story about the facts using precedents. We thus show how legal reasoning in a CBR model is equally applicable to reasoning with factual stories.

**Keywords:** Stories, precedents, case-based reasoning, argumentation

## 1. Introduction

Stories can be a powerful vehicle of persuasion. They can be used, for example, to present evidence about "what happened" in a particular case in a coherent and believable way (Bex et al. 2010), or to convince others to follow a particular course of action (Bex and Bench-Capon 2010). A story does not persuade by imparting explicit rules like an argument does, but instead by exposing a coherent and plausible sequence of events. Thus, for example, we more readily believe a set of evidence if we can structure it using some coherent story (Bennett and Feldman 1981).

One way to establish the coherence of a story is to appeal to examples, real or fictitious. In previous work (Bex 2011, Bex and Verheij 2011), we argued that a story is coherent if it fits a *story scheme*, a generalised pattern of events akin to a script (Schank and Abelson 1977). Story schemes model the way things tend to happen in the world; for instance, the restaurant script lists the roles (customer, waiter) and sequence of events (ordering, eating, paying) for a typical restaurant visit. These abstract story schemes depend on *precedent stories*: the restaurant scheme we use is based on our experiences of restaurants.

In realistic argumentative contexts people will usually find it more effective to cite a precedent story rather than an abstract story scheme. As an example, suppose two people who know each other meet on a train: on one story it is a chance encounter, in another it is an arranged meeting. If both regularly use the train at similar times a chance meeting is entirely plausible. If they rarely use the train, or live elsewhere, it is less so. But citing a particular story can help, particularly a personal one: *you remember when you met Bill on the Rialto bridge? Neither of you knew the other was in Venice, but these coincidences do happen*. The object here is to establish from personal experience that the improbable actually does occur from time to time, so the coincidence is at least possible. An appeal to personal experience or an appeal to a well-known story is much more powerful than citing a story scheme for chance encounters: *A is at location L for reason RA - B is at location L for reason RB - RA and RB are unrelated - A and B meet*. The real story provides a unity to elements which would remain entirely disconnected in the abstract scheme.

Citing a similar story thus helps establishing coherence. Here, it is important that the current story and the supporting example be relevantly similar (Walton 2010). In AI, this similarity is usually enforced by requiring that each item in the precedent matches exactly one item in the target and vice-versa, and that if there is a correspondence between two statements, then there must also be correspondences between its arguments.

If we cannot find a precedent story which matches on enough facts, we can attempt to find a more general precedent (e.g. citing a story which contains a coincidence but says nothing about chance meetings). However, in such a case it is easier to reduce the force of the example by pointing to relevant differences. These distinctions can then be *emphasised* and *downplayed*.

The work in AI and cognitive science (see Gentner and Forbus for a comprehensive overview) has so far mainly focused on retrieving precedents, matching the current story to the precedent and calculating the degree in which a story and its precedent match according to some hard-coded principles. Work in legal case-based reasoning (CBR) (Aleven 1997, Ashley 1990) presents a more fluid approach, in which identifying relevant similarities and differences between legal cases becomes the subject of argumentation.

In this paper, we show how techniques for mapping common in AI can be combined with argumentative techniques for citing, emphasising and downplaying stories can be applied to factual (i.e. non-legal) stories.

## 2. Legal Case Based Reasoning

The leading legal CBR systems are HYPO (Ashley 1990) and CATO (Aleven 1997). We will base our approach to CBR on CATO. The key idea of CATO is that cases can be described as collections of *factors*, stereotypical fact situations that have legal relevance (e.g. in cases concerning trade secrets we have *information_disclosed_*

*in_negotiations*, *plaintiff_took_security_measures*). The facts of the case determine whether particular factors are present or absent from a case. Typically a case will contain a number of factors, some favouring the defendant and some favouring the plaintiff, and the court will need to decide which set of reasons prevail.
Guidance on the relative strengths of sets of factors can be obtained from the precedent cases. If the combination presented in a case under consideration (the current case) has been found before, then it would be expected that the decision in the past case would be the decision in the current case. Normally, however, there will be no exact match and missing and additional factors will serve to *distinguish* the current case from the precedent. Equally some precedents may point one way and other the other, so providing counter examples.

CATO supports a three ply form of argument:

1. One side cites a precedent case (a case with factors in common with the current case) decided for their side;
2. Other side presents counter examples (cases with factors in common decided for the other side) and distinguishes the cited cases;
3. Original side may distinguish the counter example, and cite any additional reasons to support their side.

CATO recognises the following argument moves: Citing a case to a past case with a favourable outcome (Ply 1); Distinguishing a case with an unfavourable outcome (Ply 2); Emphasising the significance of a distinction (Ply 2); Downplaying the significance of a distinction (Ply 3); Citing a favourable case to emphasise strengths (Ply 3); Citing a favourable case to argue that weaknesses are not fatal (Ply 3); Citing a counterexample (Ply 2). In section 4 we further discuss these moves when we relate them to stories about the facts.

## 3. Stories and story schemes

Stories are finite sequences of facts, events or states of affairs that are assumed, at least for the moment, to have happened or existed. Stories are specific rather than general. Consider a simple example story about Tony (T), who killed Gordon (G) in a knife fight: *stabs(T,G) – stabbing_injured(G) – died(G)*. Story schemes are abstract scenarios, the structure of which is close to that of stories. Basically, a story scheme is a sequence containing narrative units (Propp 1968), which represent (sets of) generalized facts or types of facts: *has_motive(x) – stabs(x,y) – stabbing_injures(y) – dies(y)*. The narrative units thus represent what we call *story roles*, general roles that facts in a story can take.
A story can be matched to a story scheme by assigning the facts to their respective story roles, that is, matching the facts in the story to the relevant narrative units in the scheme (Bex 2011, Bex and Verheij 2011). This matching is similar to what in existing work in AI and cognitive science (Gentner and Forbus 2011) is called *mapping*: given a base case and a target case, a mapping consists of a set of correspondences, each linking a particular item in the base with a particular item in the target. Here, both the base and target are usually specific (instantiated) structures. We follow Schank (1986) in that we match specific stories to story schemes.
After matching, the coherence of the story is determined by checking whether the story has no "loose ends" (there are facts in the story that do not match a narrative unit in the scheme) and whether the story "has all its parts" (all the narrative units in the relevant scheme are matched by a fact in the story) (Bex 2010). For example, our example story does not complete the example scheme, as there is no fact that matches the narrative unit *has_motive(x)*.

## 4. Argument Moves and Precedents

CATO's cases are very similar to story schemes. Story schemes are clusters of abstract facts (narrative units) and cases are clusters of legally qualified abstract facts (factors). Hence, the three ply form of argument and the argument moves from CBR can be used in a factual situation as well as a legal situation.
To determine the coherence of a story, a precedent story is cited as the basis for the construction of a story scheme. After a precedent has been cited, variants of CATO's argument moves can then be used to argue about the differences and similarities between the precedent and the current story. Effectively, these argument moves are about whether the current story relevantly matches the story scheme based on the precedent.

*Citing a precedent story*: This move establishes a story scheme based on the precedent story, and then (implicitly) argues that the current story matches that scheme.

*Distinguishing a precedent story:* The precedent story and the current story will each contain elements beyond those required for matching a common story scheme. For example, the current story and the precedent may have the central action in common (stabbing), but may well differ as to the type of people involved. Such differences can be offered as reasons to argue that the current story does *not* match the scheme established by the precedent.
We can identify different kinds of distinction between stories (cf. Wyner and Bench-Capon 2007), depending on whether the current story is missing a fact required to make the story coherent, or has an additional fact (that the precedent lacks) which jeopardises the coherence of the story. In the first case, there is an *assumption* satisfied in the precedent which is not satisfied in the current case: this means that the current story is not complete, it does not "have all its parts". In the second case, there is a fact in the current story which supplies an *exception* to the story scheme.

*Emphasising the significance of a distinction:* this move accompanies a distinction and attempts to pre-empt any attempt to downplay; it seems as much rhetorical as logical.

*Downplaying the significance of a distinction*: Downplaying a distinction has variants according to the nature of the distinction. If the distinction is an unsatisfied assumption, it is necessary to point to some fact in the

current story which can play a similar role, thus having the current story complete the story scheme after all. If the current story has what appears to be an exception, downplaying involves finding a fact in the current story that provides an exception to that exception.

*Citing a case to emphasise strengths* and *citing a case to argue that weaknesses are not fatal:* These two moves respond to a distinction and involve citing other stories which can serve as precedent stories. When it is argued that the current story misses an assumption, new precedent stories can help to show that this assumption is not vital to the coherence of the story. Against the second type of distinction one can cite further precedent stories matching the current story and containing the alleged exceptions, showing that it is possible to have this additional fact in a coherent story. These moves are essentially attempts to shift the story scheme relied on slightly. The difference between *emphasise strengths* and *weakness not fatal* seems to be largely rhetorical, focusing on the strengths or alleged weaknesses of the current story, respectively.

*Citing a counterexample*: This move involves citing a new precedent story that argues for a different story scheme. Counterexamples are used to demonstrate that there are alternatives, and so avoid tunnel vision.

## 5. An example of reasoning with precedents

Having looked at the individual moves, let us consider an example to show them in action. In our example, the observation to explain is that Tony killed Gordon in a knife fight. That Tony killed Gordon is not at issue: there were plenty of witnesses as it took place quite openly in a Glasgow street. But it is important to get a story establishing Tony's motive, as this will affect the sentence. Wilma and Bert are discussing the matter. Note how by citing a precedent (top) for the current story (bottom), they are establishing a possible story scheme (middle).

- ***Wilma***: 'Tony and Gordon were youths from the same neighbourhood; perhaps it was a gang thing, like *West Side Story*.[1]' In the precedent, Bernardo (B) of the Sharks gang kills Riff (R) of the Jets gang in a knife fight. Here, ***citing a precedent story*** attempts to establish that the motive was gang feud:

*same_area(B, R)* ↓match *feud(B, R)* ↓match *kills(B,R)* ↓match
*same_area(x, y)* ↑match *feud(x, y)* ↑match *kills(x,y)* ↑match
*same_area(T, G)* *feud(T, G)* *kills(T,G)*

- ***Bert***: 'But Tony and Gordon are middle class kids, and whoever heard of middle class kids being in gangs?' Here Bert ***distinguishes*** by mentioning an **exception**: the story has an additional fact, that Tony and Gordon are middle class, that the precedent story lacks – Jets and Sharks are lower class immigrant gangs. Thus, Bert argues that the current story does in fact not match the scheme established by the West Side Story precedent, because being middle class is an exception to the rule that people from the same neighbourhood may be involved in a feud:

*same_area(T, G) ∧ middle_class(T) ∧ middle_class(G)* ***so*** *¬feud(T, G)*

This rule means that there can be no match between the current story and scheme 1.

- ***Wilma***: 'Maybe it was a family feud like in Romeo and Juliet, they were middle class.' This is an example of ***weaknesses not fatal***, citing a precedent story with a similar motive that does include the alleged exception: Romeo Montague (R) kills Tybalt Capulet (T) with a knife and the Capulets and Montagues were middle class:

*R ∧ T middle_class*, *feud(R, T)*, *kills(R, T)*
↓match ↓match ↓match
*x ∧ y middle_class*, *feud(x, y)*, *kills(x, y)*
↑match ↑match ↑match
*T ∧ G middle_class*, *feud(T, G)*, *kills(T, G)*

- ***Bert***: 'The Capulets and Montagues were Italian, and vendettas are very Mediterranean, but this was Scotland.' Bert ***distinguishes*** by mentioning a ***missing assumption***, that only in Italy do middle class people get into feuds:

*R ∧ T middle_class*, *R ∧ T Italian*, *feud(R, T)*
↓match ↓match ↓match
*x ∧ y middle_class*, *x ∧ y prone_to_feuding*, *feud(x, y)*
↑match ??no match ↑match
*T ∧ G middle_class* *feud(T, G)*

- ***Wilma***: 'But Tony and Gordon's families were supporters of football clubs involved in a notorious feud, Glasgow Rangers and Celtic FC' Wilma ***downplays*** the distinction ***by providing facts*** that can take the place of *x and y are Italian*:

*x ∧ y prone_to_feuding*
↑match
*different_clubs(T, G)*

- ***Bert***: 'But Tony was estranged from his family, as he was in a relationship with Gordon's sister.' Bert again ***distinguishes with exception***: once disowned and allied to the other family it is unlikely that Tony would continue the football feud.

*different_clubs(T, G) ∧ involved_with_family(T, G)* ***so*** *¬feud(T, G)*

- ***Wilma:***: 'But Romeo still killed Tybalt in *Romeo and Juliet*, even though he was involved with Tybalt's cousin Julia.' Wilma ***downplays*** by ***denying the exception***, pointing to her previous precedent.

*R ∧ T Italian*, *involved_with_family(R, T)*, *feud(R, T)*
↓match ↓match ↓match
*x ∧ y prone_to_feuding*, *involved_with_family(x,y)*, *feud(x,y)*
↑match ↑match ↑match
*different_clubs(T,G)*,*involved_with_family(T,G)*,*feud(T, G)*

[1] Most of our precedents will be taken from fiction. Everyone knows real examples of these schemes, but they know *different* examples: classic fiction provides a common cultural repository of stories.

- ***Bert***: 'Maybe it was about Gordon's sister. Perhaps Gordon started the fight, like in *Hamlet*, so Tony acted in self defence.' Bert now changes main story scheme by citing a ***counter example***, in which Hamlet (H) defends himself after Laertes (L) attacks him because the latter blames Hamlet for the death of his sister, Ophelia (O).

$$\begin{array}{l} attacks(L,H) \wedge defends(H) \\ \downarrow_{match} \\ attacks(x,y) \wedge defends(y) \\ \uparrow_{match} \\ attacks(G,T) \wedge defends(T) \end{array}$$

- ***Wilma***: 'But in Gordon's case, his sister did not die so he would have less incentive to attack Tony.' Wilma ***distinguishes*** by mentioning a ***missing assumption***, that the attacker's sister died.

$$\begin{array}{ll} sister(O, L) \wedge dies(O) & attacks(L,H) \wedge defends(H) \\ \downarrow_{match} & \downarrow_{match} \\ sister(z, y) \wedge dies(z) & attacks(x,y) \wedge defends(y) \\ ??_{no\ match} & \uparrow_{match} \\ & attacks(G,T) \wedge defends(T) \end{array}$$

- ***Bert***: 'In *Cavelleria Rustica*, no-one died but Alfio (A) still attacked Turrido (T) to protect his honour' Bert argues that ***weakness not fatal***: and cites another precedent that also does not include the missing assumption (that the attacker's sister died) but still matches the story scheme.

$$\begin{array}{l} attacks(A,T) \wedge defends(T) \\ \downarrow_{match} \\ attacks(x,y) \wedge defends(y) \\ \uparrow_{match} \\ attacks(G,T) \wedge defends(T) \end{array}$$

Note that the debate is not just there to satisfy curiosity. It matters legally which story is accepted. A fight mutually entered into (*West Side Story* and *Romeo and Juliet*) would be manslaughter, but a gangland killing would get a heavier sentence than a family feud in the current climate. Finally if we follow *Cavelleria Rustica* and the Laertes role of *Hamlet*, we can explain Tony's role as self defence and he might even be acquitted.

## 6. Conclusions

In this paper, we have shown how reasoning with factual stories and story schemes can be modelled in the style of legal Case Based Reasoning models. It turns out that the precedent cases of CBR have a natural counterpart in factual reasoning: story schemes. The facts of the story can then be mapped to the elements of these story schemes (narrative units) in the same way as facts of a case can be mapped to the elements of cases (factors). This allows for the argumentative moves of CATO to be applied to factual stories, enabling moves like citation and distinction in discussions.

The link between CBR and stories allows for a more realistic way of discussing story coherence: precedent stories can be cited, obviating the need to explicitly model abstract story schemes. The argument moves then enable a natural dialogue concerning the facts of the story.

The current model thus specifies Walton's (2010) Scheme for Argument from Analogy, which uses story schemes to determine the similarity between precedents cases/stories and the current case/story. This type of argument from Analogy is not just useful when talking about past events (as is the case in this paper), but also when trying to persuade someone to a particular course of action. We are more inclined to follow some course of action which has proven successful in the past. Thus, citing precedents in which success was achieved might convince someone to take the same course of action, provided their current situation is relevantly similar to the precedent.

Previous work in AI on general analogy (Gentner and Forbus 2011) captures the logic of analogy: it tells us what we require to state one and how to apply one. It does not, however, allow for argument moves *about* the analogical mappings. In contrast, the work in AI and Law (Ashley 1990, Aleven 1997) captures precisely these argument moves (e.g. analogizing and distinguishing) in a dynamic argumentation setting, whilst leaving precise mappings implicit. The framework for analogical case-based reasoning sketched in this paper therefore aims to capture both a precise matching and a possibility of argumentative discussion about this mapping.

The framework not only allows for the matching of factual stories to other factual stories (as in Schank 1986) or legal cases to other legal cases (as in HYPO and CATO), but also provides a way of matching factual stories to legal cases via legal rules (Bex and Verheij 2011). Furthermore, as discussed in (Bex 2011), the correspondences themselves, represented as legal or commonsense rules, can also be subject of argumentation. Thus, the framework is the first to capture all aspects of both factual and legal case-based reasoning in a single defeasible framework.

In this paper the theoretical foundations for factual precedent-based reasoning have been built. However, in order to make practical implementations feasible, a corpus of stories that can act as precedents is needed. These stories are ideally expressed in some common ontology to facilitate automatic processing. It is up to the young *Computational Narratives* field to tackle any problems concerning such a corpus and an ontology head-on, so as to provide an impetus not only to this research but to the entire field. Once a corpus is available, implementation of the CATO argumentation moves is relatively straightforward. In addition to the original version in (Aleven 1997), they have been implemented as a multi-agent system (Allen et al 2000) and using argumentation schemes (Bench-Capon 2012).

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