

What Are Analytic Narratives?*

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Abstract

The recently born expression “analytic narratives” refers to studies that have appeared at the boundaries of history, political science and economics. These studies purport to explain specific historical events by combining the usual narrative way of historians with the analytic tools that economists and political scientists find in rational choice theory. Game theory is prominent among these tools. The paper explains what analytic narratives are by sampling from the eponymous book *Analytic Narratives* by Bates, Greif, Levi, Rosenthal and Weingast and covering one outside study by Mongin (2008). It first evaluates the explanatory performance of the new genre, using some philosophy of historical explanation, and then checks its discursive consistency, using some narratology. The paper concludes that analytic narratives can usefully complement standard narratives in historical explanation, provided they specialize in the gaps that these narratives reveal, and that they are discursively consistent, despite the tension that combining a formal model with a narration creates. Two expository modes, called *alternation* and *local supplementation*, emerge from the discussion as the most appropriate ones to resolve this tension.

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1 Analytic narratives and the problems they raise

Narratives report on their subject matter – stories, or how human actions proceed from and result in events – by obeying definite rules that are both formal and substantial. Competing accounts of these rules exist, and they are all controversial, but they share a common feature, which is to endow narratives with various functions besides the basic one of organizing actions and events in a temporal order (e.g., narratives causally explain the actions and events, make teleological sense of them, turn them into objects of entertainment, and so on). By essence, narratives are synthetic objects, and this feature makes surprising and even paradoxical a recent expression of social sciences that is currently gaining ground, “analytic narratives”.

The studies this term refers to emerged at the boundaries of history, political science and economics. They purport to explain specific historical events and claim to do that by combining the usual narrative way of historians with the analytic tools that economists and political scientists find in rational choice theory. The paradox of *a narrative that is also analytic* is compounded by the fact that game theory, a formalized discipline, often provides the analytic tools, whereas narratives are of necessity limited to natural languages. If specialists in narratology had been aware of the new genre (they are not), they would no doubt have expressed worries about the discursive contradiction it may involve. However,

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unaware of this objection, the promoters of analytic narratives have strongly argued that, by collaborating on the same explanatory problems, narration and formal analysis deliver better explanations of historical events than each could ever do in isolation. This argument on explanation is at the core of the book, *Analytic Narratives*, by Bates, Greif, Levi, Rosenthal and Weingast [2], which has created the tag and provided the project that this tag expresses with a sophisticated manifesto.¹

The present paper explains what analytic narratives are by relying on two of the five cases studies collected in the eponymous book, as well as one outside study by this author. At the same time, it explores the two claims just mentioned, i.e., that analytic narratives might involve a discursive contradiction and that they contribute to renew historical explanation. The former claim is more foundational than the latter, but to discuss the explanatory possibilities of analytic narratives turns out to be an easy way of introducing them, so we reverse the theoretical order of examination. This will also permit discussing the thornier issues *in concreto*.

The paper is organized as follows. Section 2 uses the two cases of Bates et al. [2] to evaluate the explanatory record of analytic narratives. Section 3 extends the sample with Mongin's [18] study and carries the preceding discussion to an end. At this stage, we will have selected two schemes of analytical narratives, *alternation* and *local complementation*, as being the most relevant. Section 4 moves from explanation to exposition, raises the discursive problem again, and sketches an argument from narratology to resolve it.

2 Sampling from *Analytic Narratives* and discussing explanation

It would be better to cover *Analytic Narratives* as a whole, but the studies by Greif and Levi are decently representative of the manifesto and its implementation.

Case 1 (Greif). In the Middle-Ages, the city-state of Genoa was first governed by elected consuls (1096-1194, period I), and then by an appointed magistrate, the *podestà*, who was chosen from outside the city (1194-1334, period II). Under consulate, civil peace prevailed from 1096 to 1164 (I.1), and then civil war lasted from 1164 to 1194 (I.2). Under *podesteria*, civil peace prevailed all along. Genoa's main economic activity was long-distance trade in the Mediterranean, and this activity was prosperous concomitantly with civil peace, i.e., for subperiod I.1 and period II, but with a noticeable peak at the end of the former. The main actors of economic and political life were the clans, which appear to have kept their identity and relative influence fixed for much of the period under study. In view of this fact, the time sequence becomes problematic. Why did the clans first cooperate and then fight under the politically unchanged conditions of consulate? Why did they cooperate most efficiently at the end of the first civil peace? How did the institutional move to *podesteria* contribute to reestablish the civil peace that prevailed henceforth and why did it occur when it did? These are Greif's main explanatory questions. He notes that the historians' work fails to answer them satisfactorily and even to raise them in full clarity.

Greif responds by constructing two extensive form games of perfect information involving the clans as strategic players. The first is devised for the consulate regime and is played

¹ The book and complementary article by Bates et al. [3] constitute a manifesto both for a new kind of historical narrative and for a theoretical programme in economics and political science, i.e., the neo-institutionalist programme associated with North [21]. We only consider the former connection.

between two representative clans; it explores their trade-off between maintaining mutual deterrence and collaborating on maritime undertakings. This game explains the changes within period I by using the German Emperor's external threat as a variable parameter. Depending on whether the threat is absent or present, Greif retains a different mutual deterrence equilibrium (MDE) for his game. The presence of the external threat pushes the clans towards *mutually advantageous* MDE by the following mechanism. In general, clans compete to gain control over the consulate, which would guarantee them a higher share of trade benefits, and this competition stabilize peacefully only because they spend on deterrence resources they could more profitably spend on joint trade; this is what MDE formally capture. Now, the controlling clan also incurs the burden of external wars when they happen, so that the external threat changes the clans' *ex ante* costs and benefits of conquering the consulate; this is why MDE with less resources spent on deterrence, and more on joint trade, arise when there is such a threat. The second game, again of the perfect information extensive form, is intended for the next political regime and has thus the *podestà* as a third player. A MDE in this game explains the stabilizing effect of *podesteria*. It relies on the more elementary mechanism that, if one clan challenges the other, the *podestà* can join forces with the challenged clan to defeat the challenging one, and he is motivated to do so by his rewarding scheme and the military means at his disposal. Each time, the subgame perfection concept serves to define what an equilibrium is.²

Case 2 (Levi). In the 19th century, several western states changed their regulations of military service, moving from conscription with provisions for buying out the duty to more or less universal conscription. Historians have usually emphasized democratization and military efficiency as being the two likely reasons. However, the latter is not clear technically (a professional army would have dominated all other arrangements), and the former is objectionable in view of the timing of reforms (they often took place either before or later than universal suffrage prevailed). Starting from these objections, Levi compares the changes in France, the USA and Prussia, paying attention not only to the chronological pattern, but also to the spatially and temporally variable pattern of buying out. (There are three distinctive forms, i.e., substitution, replacement, commutation.) She does not mean to displace the previous explanations entirely, but rather to subsume them under her own.

To do so, Levi uses an informal model in the spirit of formal political economy, whereby three main actors contribute to shape national decisions on the conscription regime. They are the army, which only wants military efficiency, the government, which wants it but also pays attention to social and economic considerations, such as employing the population efficiently, and the legislator, who aligns itself on the coalition that emerges among three social groups (traditional elites, middle class, workers). With this informal model at hand, the pattern of reform in each country can be explained by hypothesizing changes in the (informal) parameters. Levi proposes two such changes, i.e., the increased demand for troops from army and government, and the legislator's evolving preferences, both of which push in the direction of universal conscription. To account for the latter, she hypothesizes a change in the politically influential coalition (the pivotal middle class would turn away from the traditional elites and become allied with the workers), and she also mentions increased preference for equality within the social groups themselves. The two main hypotheses from the historical literature appear again, though included within a more systematic explanation. The study includes carefully collected evidence to clarify and support it.

² For the game-theoretic concepts of this paper, see, e.g., Osborne and Rubinstein [22].

How analytic narratives explain. There are both significant similarities and dissimilarities between the two cases. They start by pointing out where the historical literature failed in its attempted explanations, and define their own explanatory problems accordingly. The gaps to be filled typically concern fine temporal patterns (e.g., the succession of civil peace and war under apparently unchanged conditions) or fine-grained variations (e.g., between the forms of buying out) that historians did not properly account for. This critical assessment is reflected not only in the explanatory questions, but also in the subsequent modeling choices. These are answered in terms of a *model*, with two basic distinctions to be drawn.

Case 1 includes a formal model and case 2 an informal one, and the model of case 1 draws on game theory alone, whereas that of case 2 exploits more resources. This diversity raises a definitional issue, and we respond to it by taking the following view on analytic narratives: (i) *they require formal models* and (ii) *they can borrow them from any formal branch of rational choice theory*. With restriction (i), we avoid taking the edge off the new methodology. If it just means applying rational choice hypotheses to historical events, it was practiced many times before any talk of analytic narratives, and even by traditional historians themselves.³ Levi [16], who does not make formalism a condition for analytic narratives, quite consistently claims that they are not a major innovation. The shortcoming of her position is that it deflates the tensions between the modeling and ordinary modes, which make the cases thought-provoking over and beyond their substantial contribution to history. For the sake of the discussion, it seems fruitful to dramatize these tensions, and thus take the *analytic* element also to be a *formal* element. At the same time, (ii) enlarges the toolbox beyond mere game theory, and here we join forces with Levi, whose study draws inspiration from political economy models that do not technically reduce to games. Analytic narratives should be able to accommodate not only *more* complex formal models, as hers would be if it were mathematized, but also *less* complex ones, such as are those of individual decision theory. These are meant to capture the decision makers' uncertainty when they are faced with an imperfectly known phenomenon with which there is no strategic interaction. As a basic example, think of the kind of cost-benefit analysis that might be offered to explain the foundation of Pompeii and Herculaneum, on such prosperous but also dangerous farmland as the slopes of Vesuvius. Mongin [19] cites a more controversial case in Clausewitz, suggesting that a *prima facie* interactive situation can be represented, to a degree of approximation, by a standard expected utility (EU) model of individual decision-making.

From the angle of the philosophy of explanation, the two case studies have much in common: they can be likened to the so-called *hypothetico-deductive* scheme of scientific explanation. The assumptions of the models play the role of theoretical hypotheses, and the conclusions drawn from them play the role of the empirical consequences logically deduced from these hypotheses. According to this familiar scheme, if empirical consequences match the *explanandum*, then theoretical hypotheses can serve as *explanans*, provided however that some other deductions from the same hypotheses match some other facts, so as to discard *ad hoc* explanations. The two cases testify to an effort to avoid adhocness by carrying out loose forms of independent testing. Thus, Greif supports his account of *podesteria* in Genoa by discussing other Italian cities, and Levi actually states her study as a comparison between France and the USA, with Prussia being more like a control case. The effort to secure independent testing would be more successful if the *explanans* contained proper regularities,

³ The argument should be developed somewhat here. Traditional history massively borrows from commonsense ideas on individual rationality to confer explanatory value on its narratives. How this is done in detail is a matter of philosophical controversy; compare, e.g., Hempel [14] and Dray [7].

in which case not simply the hypothetico-deductive, but also the richer *deductive-nomological* scheme of scientific explanation would apply. The authors clearly believe to have uncovered theoretical patterns that can be transferred elsewhere.⁴ However, by distancing themselves explicitly from this scheme, they implicitly recognize that they have not laid their hands on proper regularities.⁵ This negative observation is more embarrassing to political scientists and economists than it is to historians. We will return to it after extending our collection of analytic narratives.

3 Sampling from military history and concluding about explanation

This section extends the sample from the history of institutions to that of war events. While revisiting a famous military campaign, Mongin ([18], [20]) offers his study as an analytic narrative and expands on the methodological principles of the new genre.

Case 3 (Mongin). Napoleon's return to power in 1815 tragically ended with a resounding defeat against Wellington and Blücher on the battlefield of Waterloo in Belgium. On June 16th, the campaign began favourably for him, with the French beating the Prussians at Ligny, near Charleroi. On June 17th, Napoleon decided to send a large detachment under Marshal Grouchy against the defeated Prussians, and he took the rest of his army to Waterloo, near Brussels, where the English and Dutch were ready for a defensive battle. On June 18th, the French failed to break through the enemy lines and were eventually crushed when the Prussians came as additional help. Though this battle and the whole campaign have aroused innumerable histories, an explanatory gap remains: why did Napoleon decide to send out Grouchy's detachment? By doing so, he ran the risk of not having it on his side when he would face Wellington, or much worse, Wellington and Blücher together if they managed to join forces. This worst possibility effectively materialized.

To make progress with this explanatory question, Mongin proposes a zero-sum game in normal form with two players, Napoleon and Blücher, allowing for uncertainty in several ways. For one, Napoleon is uncertain about whether Blücher was crushed or only weakened after the Ligny victory, and for another, both Napoleon and Blücher are uncertain of the outcomes of the next battles, with this latter form being itself twofold, i.e., each player is uncertain of both his opponent's strategic choice and the objective circumstances (these are handled by EU calculations). Given suitable parameter restrictions, von Neumann and Morgenstern's minimax solution concept for two-person, zero-sum games delivers a unique equilibrium, which involves pure strategies. This arguably delivers not only an equilibrium, but also rational choice recommendations. From his three pure strategies, keeping the army together, sending out Grouchy for a mere pursuit, and sending him out for preventing Blücher from joining Wellington, Napoleon should choose the last; and from his two strategies, retreating to Germany or joining forces with Wellington, Blücher should choose the latter. That Napoleon effectively chose the interposition strategy can only be conjectured, because his orders were not fully reported, but the game reinforces this hypothesis. The *ex post* failure is not an objection since it could result from the objective circumstances turning unfavorably and Grouchy misapprehending the plan – some historical evidence points in these two directions.

⁴ See, e.g., Greif's ([11], ch. 6) "theory of endogenous institutional change" in which he fits Genoa as a particular case.

⁵ Bates et al. ([2], p. 11–12) say "covering laws explanation" rather than "deductive-nomological explanation". Hempel ([14], [15]), whose philosophy of explanation is at stake here, gives a more general sense to the former expression, which he means to cover both probabilistic and deductive explanation.

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Overall, the study exemplifies how an analytic narrative can be *both formal and hermeneutic*, since assumptions and conclusions are assessed in terms of evidential reports that are always incomplete, equivocal, and given the high stakes, unavoidably biased. The conclusions adjudicate among existing positions, indeed by reinforcing classic pro-Napoleonic arguments against equally classic anti-Napoleonic ones.

More on how analytic narratives explain. Like cases 1 and 2, case 3 starts from the extant historical literature, defines explanatory questions *negatively* from this corpus, reserves the modeling treatment to the major gap found in it. Mongin ([18], [20]) goes so far as to argue that to work on an analytic narrative requires these three conditions; otherwise, there would be reason for breaking up with the traditional narrative mode of historical explanation. This claim presupposes another, i.e., that the traditional narrative mode can be explanatory. Many philosophers of history agree, but some doubt or even disagree; see, e.g., White [24].

Unlike case 1, case 3 represents the game of interest in *normal* form (whereby players move once, simultaneously and independently) instead of the representation in *extensive* form (whereby players make successive moves and special dependencies result from this succession). Bates et al. [2] make a plea for the latter form, as if this were the only one adapted to historical work, but case 3 is sufficient evidence that the former is also applicable. If the extensive form is so acclaimed, this is presumably because its sequential structure seems capable of paralleling concrete sequences of actions, as made available by historical narratives, but we doubt whether this harmonious parallelism can really take place. Greif's games involves abstract moves, such as "to challenge", "to give in" and "to retaliate" in the *podesteria* game, which do not relate in any simple way to the actions that the Genoan clans once made. A similar comment would apply to the other extensive form games in *Analytic Narratives*. If the moves are idealizations, their sequential ordering cannot represent the passing of historical time, and the alleged superiority of extensive forms over normal forms vanishes.⁶ Another defense of the latter is more technical. They allow more easily than the former for an elaborate treatment of uncertainty, as the game in case 3 illustrates. Bates and al. [3] honestly recognize that their work remains short of the target from this perspective.⁷

Perhaps even more strikingly, case 3 differs from the first two by the nature of its *explanandum* and proposed *explanans*. It is directly concerned with interactive decisions, and these are made by designated individuals. By contrast, cases 1 and 2 are directly concerned with *events* (states of affairs), like civil war or the prevalence of a conscription type, and only indirectly with interactive decisions, so that an interpretive reduction step is needed; moreover, the hypothesized decision makers, such as clans or the government, are not individuals, let alone designated individuals, but *collectives*. This is not all there is to the comparison. The *explanandum* of case 3 is narrowly circumscribed in time and space, whereas those of cases 1 and 2 extend in time or even time and space. To some extent, we recover here a topos of 20th century historical methodology, i.e., the contrast between traditional narrative history, which centres on the deeds of historical characters, and the more recent trends that deemphasize decisions and designated actors, while also enlarging the spatio-temporal scope of inquiry. Famously, the French *Annales* school has dramatized this contrast.

⁶ Note that we do not discuss the quality of the idealizations made to define the moves, which is variable across *Analytic Narratives*. We only stress a consequence of the fact that idealizations are (and need to be) made.

⁷ Zagare's [26] more sophisticated analysis of the July 1914 crisis makes a step forward by resorting to games of extensive form with incomplete information. The equilibrium concepts for this case are substantially complex.

Work along the older line is more clearly amenable to explanations given in terms of individual actions, hence to analytic narratives, than work according the recent trends. Roughly speaking, historians are more likely to concede case 3 than cases 1 and 2, assuming equal scholarly merit across these studies. By a similar reaction, Mongin [18] recommends exploring more cases in military strategy on the grounds that the assumptions underlying the technical treatment have a better empirical warrant there than elsewhere. At the same time, one must acknowledge that those cases are in some sense too easy, and it is more challenging to apply game- and decision-theoretic tools to cases in which the individual decision structure needs reconstructing and applies to broad time lags. A balance must be struck between theoretical audacity and empirical reasonableness. Case 1 is perhaps the best candidate for a right balance, because the large scope is made acceptable by the stability of the proposed decision structure in terms of clans, and because clans, despite being collectives, can be given the attributes of strategic players with some plausibility.

From the vantage point of the philosophy of explanation, the last case obeys the *hypothetico-deductive* scheme of scientific explanation no less than the previous ones, but leaves even less room for independent testing than these do. This connects with the choice of not only a more specific *explanandum*, but also of a more specific *explanans*. The Waterloo game is usable only on the *explanandum* for which it was devised, whereas the *podesteria* game, having more abstract structure, can in principle be used elsewhere. However, Greif contents himself with informally comparing Genoa with other towns, and the likely reason for this is that he does not have sufficient data outside Genoa. One should expect practical failures of independent testing to be very common with analytic narratives. It follows that the difference in generality between *explanantia* does not entail a strong difference in the explanatory mode.

We can reinforce this point as follows. While it is often impossible test a game as a whole on something else than the *explanandum* it is devised for, this may be possible for some of its individual assumptions. The *podesteria* game shares assumptions with the mutual deterrence games that have been explored fruitfully in international relations,⁸ and the Waterloo game shares its two-person, zero-sum assumptions with at least one predecessor.⁹ It is conceivable to test these structural assumptions in a variety of contexts, whether historical or not, and even experimentally. That independent testing can proceed in this way erodes the difference between more or less historically specific games.

We can conclude generally that the cases covered here do not exhibit critical variations in their explanatory functioning, despite the preferential disciplinary connections, which may suggest otherwise (with political science and economics for the first two, and history for the third). To use a familiar contrast, *all* analytic narratives are to be located on the “ideographic” rather than the “nomothetic” side of explanation. They are in this sense closer to the hermeneutic way of traditional history than to any construal of scientific explanation, be it the hypothetico-deductive one or any other. However, this first conclusion must be weighed against the opening point of the paper, i.e., that modeling and narration are discrepant expository modes. We now move from the issues of explanation to those of exposition.

⁸ See, e.g., Brams ([4], [5]) and Zagare ([25], [26]).

⁹ Haywood [13] used this apparatus to revisit the historical account of two campaigns in World War II. Zero-sum games are *prima facie* more relevant to war studies than to international relations studies, but this picture must be refined by taking the war objectives into account, as Clausewitz famously recommends.

4 Analytic narrative as a mode of exposition

Consider how Greif presents case 1. He organizes it chronologically, covering first civil peace under consulate, then civil war under consulate, and finally civil peace under *podesteria*. He subjects each period or sub-period (more particularly the first two) to a ternary exposition, i.e., he first provides a standard narrative that states the facts and introduces the *explananda*, second states a game-theoretic model based on relevant explanatory hypotheses, and third provides *another narrative* that finalizes the explanations. This revised narrative differs from the initial one, both because it borrows theoretical terms from the modeling part (e.g., “mutual deterrence equilibrium”) and because it brings out some more historical evidence. This is, however, a narrative all right, so we have an *alternation* scheme.¹⁰

This exposition does not appear in an earlier, also very substantial piece by Greif [10], which uses a game-theoretic model to explain how 11th century Mediterranean traders entered in binding agreements, despite the unavailability of formal sanction mechanisms. The exposition proceeds through the previous stages one and two, but differs concerning the third, because it ends up, very classically, with a non-narrative discussion of the explanatory achievements of the model. As a secondary difference, the study is limited to a single period.

Consider now how Levi develops case 2. She (i) states the historical problems of conscription, (ii) introduces the theoretical hypotheses of the political economy model, (iii) proceeds to a detailed narrative on how conscription laws changed, and (iv) compares relevant facts from this narrative with the previously stated hypotheses. Ignoring (i), one would have a classic *hypothesis-testing* apparatus, i.e., a statement of hypotheses, followed by a statement of empirical evidence, followed by a conclusive assessment. If hypothesis testing is the aim, the evidence should remain as much as possible independent of the hypotheses, and it becomes consistent to avoid the theoretical language of (ii) when developing (iii). Levi’s writing precisely conforms to this requisite. However, her study also clearly obeys an explanatory purpose, for one can fuse (i) and (iii), considering that this states the *explananda*, and that the explanatory hypotheses come in (ii) before being evaluated in (iv). Viewed in this way, case 2 comes close to Greif’s [10] more classical piece. Both allow narration to enter only the *explanandum*, not the *explanans*, and they are best described as *analyzed narratives*.

Case 3 exemplifies still another form of exposition. It begins with an ordinary narrative of the Waterloo campaign written like (and to some extent parodying) extant histories; this serves to introduce both the main facts and the (here unique) *explanandum*. Then the study introduces the game-theoretic model that contains the (also unique) explanatory hypothesis, and a reflective stage assesses this hypothesis while bringing out more historical evidence. A distinctive feature of this study, it considers the initial narrative as being essentially satisfactory, except for an explanatory gap it finds at a critical juncture. The model and its assessment are like *a parenthesis in the initial narrative*, which can be resumed once the gap is filled. This scheme differs from that of analyzed narratives, because the narrative plays the role of an *explanans*, not simply of an *explanandum*, and it also differs from alternation, because it is the initial narrative, not a revised one, which has the final explanatory word. This distinctive scheme can be referred to as *local supplementation*. Consistently with a relatively modest purpose, it is more likely to arbitrate between existing sketches of explanations than to provide entirely new explanations.

Conceptually, an analytic narrative is a narrative that is somehow *made analytic*, not an analyzed narrative, and we will thus concentrate on the two expository schemes of alternation

¹⁰ Bates’s and Weingast’s studies in *Analytic Narratives* [2], which are not reviewed here, also follow an alternation scheme, however with some differences.

and local supplementation. This is not to say, of course, that the analyzed narrative scheme is unimportant for historical explanation; quite the contrary, it is basic to most the work done in economic history and historical political science. We only mean to say that it does not capture what is new and challenging with analytic narratives.

We now have to check whether the two schemes of interest are not subject to discursive inconsistencies. Here we need some basic groundwork from narratology, and to begin with, the distinction between a narrative text and the narrative *form of discourse*.¹¹ As such, a narrative text can very well include parts that are not narrative, in the form of discourse sense, but rather descriptive, informative, explanatory, argumentative. All these received forms are *prima facie* acceptable within a narrative text, especially when it is factual (nonfictional) as those of history must be.¹² By contrast, it appears that a narrative text cannot accommodate some other received forms, such as the injunctive one.

These observations suggest an argument to conclude that analytic narratives are consistent when they conform to the local complementation scheme. It simply consists in saying that such analytic narratives are narrative *texts*, which include, among their parts in non-narrative *form*, the statements of formal models and their consequences. These parts are clearly not descriptive, but explanatory, and although this may be less obvious, they are also informative and argumentative. To see that, consider how the author of case 3 *informs* the reader of basic mathematical facts about zero-sum, two-person games, and *argues* for the approximate relevance of his model despite the shortcomings he concedes. Here information and argument are substitutes for a *demonstration* that has to be provided somewhere, but certainly not within the same text, which could accommodate the demonstrative form of discourse no more easily than, say, the injunctive form.

However, to distinguish between *prima facie* acceptable and unacceptable discourse forms is only one step in the argument. Narrative texts put implicit constraints of what they can effectively absorb from the former. It is often suggested that quantity matters – non-narrative parts should be brief so that the author would not lose the thread of the narration. But this view is usually held concerning fictional narratives, whereas factual narratives, especially historical ones, appear to be more tolerant. At least for them, what matters is not the absolute length of the non-narrative parts, but rather *how these parts connect with the narrative parts*. An example from military history will bring the point home.

Clausewitz's [6] monographic study of the Waterloo campaign is based on a nearly perfect alternation of narrative and non-narrative chapters. The former state the background facts and the protagonists' strategic moves with extreme temporal precision and refrain from passing judgments; the latter critically evaluate the adequacy of the strategic moves. Despite the high proportion and trenchantly different style of the non-narrative chapters, the book remains a narrative text, because Clausewitz submits his examinations to an implicit rule of temporal consistency. That is, they never extend beyond what has been narrated thus far and they principally relate to what was narrated last. The explanations can thus be *dated* on the same time scale as the events and actions they discuss. In a sense, they are part of the story told by the book, and this is why it remains a narrative text despite widely using the explanatory and argumentative forms of discourse.

¹¹ Early narratology did not explicitly make this distinction (e.g., Barthes [1]) or expressed it differently (e.g., Genette [8]), but it has become universal henceforth, even though the terminology fluctuates. By contrast, what is not stabilized is the classification of the discourse forms. None has won the day, despite the fact that they are debated since Aristotle's *Poetics*.

¹² Narratology usually draws a significant distinction between factual and fictional narratives, in which case it automatically treats historical narratives as cases of the former; see, e.g., Genette [9]. There are dissenters, however.

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Clausewitz sets an illuminating precedent for the local supplementation scheme. The analytic intrusions into the narrative flow could be as lengthy and complex as the topic requires, but they should respect the rule of temporal consistency, and in particular avoid irrelevant anticipations, generalizations and comparisons. Within the constraint imposed by this rule, Clausewitz develops his examinations from the viewpoint of a best informed narrator (who knows more than the protagonists and even knows what their knowledge consists of). This is one way, but there is another, actually more in the spirit of case 3, which consists in idealizing the protagonists' subjective deliberations. Narratology draws a related distinction between the standpoints of the author, the narrator and the characters.¹³

Thus far, we have been discussing how a narrative text can feasibly accommodate non-narrative forms of discourse. This may be sufficient for local complementation, but clearly not for alternation. There, the *revised narrative* aims at combining forms of discourse with each other, and especially, the narrative with the explanatory form. We are led back to an already-mentioned problem, which we cannot pursue in this paper: is the narrative form at all capable of conveying explanations? If it is not, it is impossible to rewrite the initial narrative so as to make it explanatory; but if it is, a new question arises, i.e., whether explanations that originate in theoretical models can properly be expressed by narrative means.

An obvious point remains to be addressed. We have said nothing yet on the complication brought about by the use of formalism. Pre-analytic narratives such as Clausewitz's do not use any, which facilitates the discursive consistency check in their cases. We locate the tension in the *semantics* of the formal language, not in this language by itself. For one thing, the recourse to mathematical symbols can be minimized, and it is effectively modest in the way cases 1 and 3 are written; for another, tables of numerical data, geographical maps or diagrams, which are symbols of a different kind, occur in factual, especially historical, narrative texts, and they are considered acceptable there. But if the mathematical expressions, or the ordinary words used to replace them, have very specialized meanings, a real difficulty arises; think, for instance, of "zero-sum game" or "mutual deterrence equilibrium".¹⁴

In our view, the solution to this difficulty could be found in the genesis of the formal theories of rational choice. They evolved from informal conceptions of human action that belong to an immemorial source – what cognitive scientists call *folk psychology*. The stock idea is to explain an observable action by what can be hypothesized from the agent's desires, on the one hand, and his or her beliefs, on the other. In individual decision theory, this duality has become utility and probability. Game theory, which historically emerged later, borrows from a more complex background, but its organizing concepts, and even those of equilibrium, are not completely esoteric either. With some effort, those of political economy could also be traced back to refinements of common usage. The fact that analytic narratives do not draw upon formal theories indiscriminately, but on this group specifically, means that there is a common ground between the semantics of their formal concepts and the intuitions that come to the mind of a cultivated, but non-specialized reader (perhaps the typical historian?). This claim could be substantiated by revisiting cases 1 and 3 in semantic detail.

To supersede the semantic objection is important for the local supplementation scheme, but even crucial for the alternation scheme. What primarily separates the revised from the initial narrative in this scheme is the use of terms that come from the formal modeling stage.

¹³ Genette [8] is an authoritative reference here.

¹⁴ This difficulty was usefully pointed out in Grenier, Grignon, and Menger [12] and it is further explored in Mongin [18].

If this material brings with it semantic ideas that conflict with those accompanying the (still necessary) use of ordinary words, the revised narrative will not be properly understandable, and it will also be incoherent discursively.

5 Conclusions

We have explained what analytic narratives are by starting from what exists and gradually becoming more normative. We have restricted them in several ways, up to the point of retaining only two operational types. We have gone some way towards giving these types discursive foundations, although more thoroughly for one than the other; the full argument would need a longer paper. A perhaps easier task, we have argued that analytic narratives can improve historical explanation significantly. Meanwhile, we have likened the novel explanations to the traditional ones from the vantage point of the philosophy of scientific explanation.

Another comparison is in view, though again more for a later extension of the present work. How does the analytic narrative project relate to the project of studying narratives from the computational angle? We foreshadow two possible answers. The first one, which is technical, has to do with the computational aspects of the formal models in analytic narratives. The received solution for games in normal form is Nash equilibrium, which has long been studied from this angle.¹⁵ There even exist software packages to compute the Nash equilibria of n -person games in normal form when complete information prevails, one early example, *gambit*, being still in use (see the account by two of the authors in McKelvey and McLennan [17]). When games are in extensive form and perfect information holds, the received concept of solution is subgame perfection; this is a refinement of the Nash equilibrium concept when the games are represented in normal form. This solution is unexceptionally computed by the backward induction algorithm, which has also been studied extensively (see the recent review by Shoham and Leyton-Brown [23], which also covers the computation of Nash equilibrium). To apply backward induction, hand calculations are sufficient on schoolroom examples, but give way to semi-formal heuristics on more realistic examples such as the games of case 1, and in applying these heuristics, there is always the risk of leaving aside relevant solutions. A computer-aided approach may be commendable here.¹⁶

Second, and much less technically, the transformations that standard narratives incur to become analytic narratives bears some relation to the transformations they incur to become computational narratives. In either case, simplification, abstraction and modeling must take place to prepare for the final stage. There are a number of ways the work in computational narratives fulfils this requisite, e.g., by making a precis of the standard narratives in a fragment of ordinary language, by translating them into a rich logical language with event and action predicates, by converting them to decision-event trees or other diagrammatic objects. From an all too quick review, the list of existing procedures does not seem yet to include the decision- and game-theoretic tools that analytic narratives rely on. Could it not be extended in this new direction? Consider the (limited) standard narrative: “In the morning of June 17, 1815, Napoleon examined the consequences of his victory against Blücher on June 16, the perspectives of his battle against Wellington on June 18, the possible strategies opened to him, and having pondered over his decisions, he called upon Marshall Grouchy

¹⁵In zero-sum two-person games, Nash equilibrium coincides with von Neumann and Morgenstern’s minimax.

¹⁶Greif precisely uses such heuristics.

to let him know what they were. In the middle of the day, Grouchy left in the north-east direction with an important detachment of the French army”. This can be transformed in all the ways mentioned above, but also – and we have argued, fruitfully – in the way explained by this paper. We recommend this as an addition to the list.

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