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What are patterns in the humanities?

Chiel van den Akker

Department of Art and Culture, History and Antiquities, VU University Amsterdam, Amsterdam, The Netherlands

ABSTRACT

This paper is concerned with patterns in past human behaviour, what they are, and how this relates to the detection of patterns in data by means of computation. Theorists have not given patterns the attention they deserve. Therefore it is far from clear what patterns are and to what purpose scholars may use them. This paper presents eight propositions on patterns which hold true for patterns found 'by hand' and patterns found 'by computation'. One such is that a pattern is discernible in behaviour when we subject it to the intentional stance, as the philosopher Daniel Dennett argues. Here behaviour is part of an intentional system. This paper's argument is that the patterns found 'by computation' too are part of an intentional system. To substantiate this claim this paper discusses two important examples of detecting computational patterns in the domain of the humanities.

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Introduction

The so-called digital or computational *turn* introduces new methods and techniques in the humanities.[1] One such is the detection of novel patterns in large sets of data. Quantitative

CONTACT Chiel van den Akker c.m.vanden.akker@vu.nl Department of Art and Culture, History and Antiquities, VU University Amsterdam, Boelelaan 1105, Amsterdam, 1081 HV, The Netherlands

[1]The past few years several collections are published that show the variety and richness of these new methods and techniques. See for example Berry (2012) and Schreibman, Siemens, and Unsworth (2016). I have some reservations about the word 'turn'. The word was warmly welcomed in the humanities, for it provided a new way of justifying the work that was done: every new turn requires the full attention of the scholarly community and financial support, but anyone who takes 'turns' too seriously cannot but become very dizzy, for an inventory of the turns that (branches of) the humanities have taken at an increasing rate the last three decades or so easily exceeds the thirty-five (not including the 'returns' we have witnessed) – think of the acoustic, affective, algorithmic, animal, anthropological, archival, bodily, cognitive, computational, connective, contextual, constructive, critical, cultural, datalogical, deconstructive, discursive, digital, empirical, emotional, ethnographic, gender, global, historic/historical, infrastructural, inward, linguistic, material, medial, metaphorical, naturalistic, narrativist, nominalistic, ontological, performative, pictorial, postcolonial, posthuman, postmodern, reflexive, religious, spatial, social, temporal, and transnational turn. Those turns are not only evidence that the humanities (and the humanities disciplines) are fragmented, but may also be a sign that the humanities are in a self-created crisis of justifying their research. There is much irony in the fact that the mother of all turns, the linguistic turn, which first and foremost is concerned with the self-conscious reflection on the language used to get the work done in the humanities, resulted in the enthusiastic embracing of the word 'turn'. The computational turn in the humanities should be distinguished from the computational turn in philosophy in the 1970s and 1980s (Brey and Søraker 2009). With the introduction of computers at that time it was realised that old questions about mind, action, ethics, cognition, and so on, were to be asked anew in light of this new technology. Additionally, the philosophy of computing was born, which studies the concepts and assumptions of theories of computing. This paper is an example of the latter inasmuch as it focuses on pattern as a systematic notion in a theory of computing in the humanities.

methods are not new in the humanities – in the 1960s and 1970s many a polemical discussion was held about its usefulness and desirability among positivists and hermeneutic minded scholars, in particularly in the domain of historical scholarship. Some even argued that quantitative methods would at last turn history into a science (e.g. Le Roy Ladurie 1979, 15).[2] One important difference is that quantification then was concerned with economics and demographics, whereas computation in the humanities today is especially concerned with culture and linguistics, or, as some put it, with 'culturomics' (Michel et al. 2011) and 'distant reading' (Moretti 2013).[3] As in the heyday of quantitative history, it is argued by some (e.g. Aiden and Michel 2013, 211–212) that the new computational methods will make the humanities (more) scientific.

This paper is concerned with patterns in past human behaviour, what they are, to what purpose scholars may use them, and how this relates to the detection of patterns by means of computation. It has been claimed that patterns have always been part and parcel of the humanities (Bod 2013a, 2013b). This I agree with. Therefore, I am interested not only in patterns found 'by computation', but also in patterns found 'by hand' and observed in human behaviour. The reason that patterns have always been part and parcel of the humanities, and why I agree with that claim, is that the humanities are concerned with human behaviour, and interpreting behaviour, I will argue, depends on discerning the pattern that the behaviour makes.[4] Theorists have not given the concept of pattern the attention it deserves. This explains why it is far from clear what patterns are and to what purpose scholars may use them. In what follows I will present eight propositions on patterns which hold true for patterns found 'by hand' and patterns found 'by computation'. My interest here is in pattern as a systematic notion in a theory of the humanities.

Patterns in behaviour

I will start with four propositions on patterns that I draw from Dennett's (1991) essay 'Real Patterns' which discusses pattern recognition in human behaviour. My interest here is in what patterns are, the purposes for which humanities scholars may use them, and how this relates to the detection of patterns in data by means of computation.[5] Four propositions on patterns can be drawn from Dennett's essay:

[2]An overview of the discussion of this matter in historiography and the reasons why the initial enthusiasm for quantitative history gave away to disillusionment and the asking of new questions that could not be answered by those methods, is provided by Stone (1979). This does not mean that the use of quantitative methods to study social and economic processes stopped after its peak in terms of attention in the 1960s and early 1970s, for it did not and undeniably made progress over the years.

[3]I might add that 'culturomics' and 'distant reading' did not develop out of quantitative history: they developed out of computational linguistics. Cf. the literary scholar Franco Moretti, who relates his notion of 'distant reading' to quantitative history (Moretti 2013, 44). I further discuss 'culturomics' and 'distant reading' below.

[4]For Rens Bod, the concept of pattern is an 'umbrella term that covers everything that can be found between inexact trends and exact laws' (Bod 2013a, 172, 2013b, 9). This betrays a certain lack of understanding of the concept of pattern are and why they have always been part and parcel of the humanities. The oldest explicit characterizations of patterns being central to the humanities I know of date to the 1930s. Several such characterizations are collected by Kroeber and Kluckhohn (1952), one of which states that culture 'consists of patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols'.

[5]Dennett's own concern is different from this as he focuses on the question whether 'beliefs and other mental states are (…) *as real as* electrons or centers of gravity' (Dennett 1991, 30). He defends the position which he refers to as 'mild realism'. This issue will not be pursued here. To be sure, the issue is fundamental to our understanding of the propositions on patterns. The following remarks may suffice. One of the people Dennett disagrees with in his essay is Rorty and Rorty (1985) responded to Dennett. I accept Rorty's pragmatist view on this matter when he states: 'I still need an answer to the question: what does thinking of a pattern as *real* do *except* remind us that the pattern has been found useful in

(1) '[O]ur power to *interpret* the actions of others depends on our power—seldom explicitly exercised—to predict them.' (Dennett 1991, 29)
(2) '[T]he pattern is discernible in agents' (observable) behaviour when we subject it to (…) the intentional stance.' (Dennett 1991, 30)
(3) A 'series is not random—has a pattern—if and only if there is some more efficient way of describing it' (Dennett 1991, 32).[6] (Dennett specifies this somewhat as: 'A pattern exists in some data—is real—if *there is* a description of the data that is more efficient than the bit map, whether or not anyone can concoct it.' (Dennett 1991, 34)[7]
(4) 'When two individuals confront the same data, they may perceive different patterns in them, but since we can have varied interests and perspectives, these differences do not all count as disagreements.' (Dennett 1991, 35).

I take these propositions to be correct and what follows will support this. The first two propositions concern the interpretation of the behaviour. These two propositions need careful explication. I will present a brief and basic account of taking the intentional stance. The account is brief because here I am interested in patterns rather than in the intentional stance.[8]

I start with the observation that we must be able to predict the behaviour of others if we want to interact and have some sort of interpersonal relation with them. If we would *not* to be able to count on our fellow human beings to behave in ways that we can predict, we would not be able to do such mundane things as driving our cars and paying for our groceries. This does not answer the question why a pattern is discerned in the behaviour when we subject it to the intentional stance. The following does. To adopt the intentional stance towards behaviour is to take and treat human beings as rational being. We discern patterns in behaviour inasmuch as the behaviour is *taken* to be rational by us, that is, inasmuch as we take and treat agents as having intentions, desires, and beliefs. *Attributing* intentions, desires, and beliefs, makes the behaviour rational for us. This *is* taking the intentional stance. Below I will give several concrete examples of propositions (1) and (2). First I want to establish that scholars take the intentional stance when they try to understand past behaviour. Several objections to this claim immediately come to mind.

Interpreting behaviour by being able to predict it does not imply that all behaviour is predictable, for surely, people often behave in surprising and unpredictable ways, and much of what is of interest in human behaviour has to do with what is exceptional. 'But that unpredictability is only interesting against the backdrop of routine predictability on which all interpretation depends,' as Dennett (1991, 30n5) rightly observes. This objection therefore supports rather than undermines the claim that scholars ought to take the

anticipating the world?' (Rorty 1998, 115). However, I take patterns as 'useful in anticipating the world' as another way of saying what Dennett says in the first proposition that I draw from his essay. Therefore, we can agree with both Dennett *and* Rorty on this matter.

[6]Dennett adds in a note a quotation from Gregory Chaitin: 'A series of numbers is random if the smallest algorithm capable of specifying it to a computer has about the same number of bits of information as the series itself'. (Dennett 1991, 32n10).

[7]This does not commit us to realism. Take the following example. The patterns in the stars we know as constellations offer an efficient description of the data (i.e. the stars). The patterns are there, but not before we 'found' them. This issue was already dear to the heart of James ([1955] 1965, 164–167).

[8]I benefited from the discussion of Dennett's intentional stance by Brandom ([1994] 1998, 55–62). An overview of the place of intentionality in the context of both the philosophy of science and the humanities and the disagreements between positivism and hermeneutics is provided by Von Wright ([1971] 2004, 1–33).

intentional stance as they try to understand past behaviour. A similar argument can be made against the objection that intentions, desires, and beliefs can seldom be read straightforwardly from past human behaviour, especially since such behaviour can be very different from our own. Interpreting behaviour by taking the intentional stance may fail or turn out to be mistaken, but only against the backdrop of successful interpretations is it possible to identify such failure and mistake. This objection therefore too supports rather than undermines the claim that scholars take the intentional stance. Taking the intentional stance is no guarantee for successful or correct interpretation: it 'merely' guarantees interpretation in terms of intentions, beliefs, and desires. Interpreting behaviour only *begins* by taking the intentional stance.

Another objection against taking the intentional stance is that scholars study the *results* of behaviour rather than the behaviour itself, such as laws, paintings, temples, letters, and tax returns. However, something is only the result *of* behaviour if the intentional stance is taken towards the behaviour, for to interpret something as the result of behaviour is to interpret it as resulting from beliefs, intentions, and desires, such as what agents strive for, make, are obligated to do, wish to accomplish, and so on. This is not to say that taking the intentional stance implies that behaviour and its results are to be explained in terms of (authorial) intentions (and in terms of (authorial) intentions only). It is to say that behaviour is explained by taking and treating agents as rational sentient beings who are more or less responsible for their actions.

We cannot explain an action by referring to what is rational or appropriate to do in some circumstance, for that does not explain why the action was in fact done (Hempel 1974, 102). We begin to explain an action by taking the intentional stance, albeit only if we are interested in agents as rational human beings. We can imagine a science that does without the intentional stance. But such science would not lead to anything even remotely resembling what scholars and social scientists do and have done, for it would purge the interpretation of behaviour of all attribution of beliefs, intentions, and desires.

Behaviour and what results from it are taken to be part of an intentional system, even if the outcome of the behaviour is unintended and unforeseen. If (part of) the humanities is said to be concerned with the *circumstances* of behaviour rather than with the behaviour itself, and those circumstances are said to determine the behaviour of individuals, then the patterns found in the behaviour are explained by the circumstances allegedly determining that behaviour. This would still require taking the intentional stance, for the relation between the circumstances and the behaviour requires us at some point to treat agents as being responsive to the circumstances they believe themselves to be in, one way or the other. Taking the intentional stance does not imply that all explanation is intentional: it implies that all behaviour is understood as being part of an intentional system.

Before I turn to the question how the four propositions on patterns I drew from Dennett's essay relate to patterns found by computation, I will first illustrate these propositions with a randomly chosen example from the domain of history to show that patterns indeed are part of the work done in the humanities. This will give us two more propositions on patterns. Consider Georgia Cowart's wonderful *The Politics of Spectacle*. The first two aims of her study are:

> to examine the overlapping, interdependent, and at times oppositional politics of power and pleasure as they were performed within this festive space; to observe the strategies of

> artists as they created and at times deliberately undermined a propaganda of [Louis XIV's] kingship. (Cowart 2008, xv)

These strategies of artists are patterns discerned in the artworks they created and which are studied by Cowart. These patterns are found 'by hand', but it is not hard to conceive that computational techniques may enhance detecting these sorts of patterns in a more extensive set of data that is too big for humans to handle manually, bringing the 'experiment into the humanities' (Bod 2013a, 174). Such techniques may also confirm or disconfirm what Cowart already found, and perhaps in an instant instead of after many laborious hours of work. This is clearly a major benefit of the use of computational techniques (a.o. Aiden and Michel 2013, 114). There are other ways for scholars to study large(r) sets of data without taking recourse to computational methods, for example by working in teams rather than individually, but manual labour neither brings the experiment nor more efficient methods of confirming or disconfirming found patterns into the humanities. Computational methods allow a change in the scale of the data that can be studied, which is too large for individual scholars to handle, and this may bring to light patterns that otherwise would be impossible to find. We can now add two more propositions on patterns to our list:

(5) Patterns are discerned by hand or by machines.
  5.1. And the latter will often do so more efficiently.
  5.2. And some patterns are presumably only found by machines, whereas others can only be found by hand.
(6) Patterns can be confirmed and disconfirmed.

What I said about Cowart's book is in agreement with the propositions on patterns that I drew from Dennett's essay. The patterns are recognized in human behaviour (2). The description of the strategy is an efficient way of describing the many artworks – the data – that Cowart studied, as proposition (3) dictates. Clearly, Cowart adopts the intentional stance and takes and treats the artists as rational beings, having intentions, beliefs, desires, hopes, wishes, regrets, and so on (2).

Cowart was able to discern the strategy of artists because she was able to reason from the document back to the action of which the document was the result, which not only means that she was taking an intentional stance (2), but also shows that our power to interpret an action depends on the ability to predict it (1), for to see some result as the outcome of an action is to know the pattern that the ground and consequence of an action makes. She probably could also predict or anticipate, with more or less success, in which documents similar patterns could be found. Maybe other scholars will find different patterns in the artworks she studied (4).

Now, it is crucial to note that all of this does not make Cowart's study an *historical study* in the sense of a being a comprehensive, retrospective understanding of the past expressed in a narrative. This is not in any way a criticism of patterns. It is just a distinction. Cowart 'merely' detected a pattern in artworks originating in a certain period in the past. Patterns in data, we might say, alert us to events under a description. As proposition (3) states, they are efficient descriptions of data. Here the point is that patterns are not in opposition to narrative, as is sometimes argued. According to Berry

(2011, 13) for example, computation introduces 'new methods, which tend to focus on the identification of novel patterns in data as against the principle of narrative and understanding'.[9] Computation thus opposes and perhaps supersedes narration. Similar views have been expressed by others. But Berry's view betrays a misunderstanding of the role of narrative in historical scholarship. One of the central lessons of twentieth century philosophy of history is that narratives are not simply presentations of research results, as if those results are similar to the conclusions of the sciences that are detachable from what counts as evidence for those conclusions. Historical conclusions (or theses) are *ingredient* to rather than *detachable* from the presentation of the evidence, as Mink (1966, 39) argued.[10] They are perspectives 'in terms of which reality should be analyzed or viewed', as Ankersmit (1983, 198) has it. Our seventh proposition on patterns is therefore thus:

(7) Patterns do not oppose narratives; they alert us to events under a description.

When Berry (2011, 14) says that he does not 'want to overplay the distinction between pattern and narrative as differing modes of analysis' because 'patterns implicitly require narrative in order to be understood', then the term 'narrative' has a different meaning to the meaning of narrative as a comprehensive synthesis which is the result of the retroactive alignment of events (Danto 1985; Mink 1987). Narrative is not a mode of analysis. Nor are narratives implicitly required to understand patterns, for patterns are perfectly understandable in themselves. Moreover, patterns help us understand the behaviour in which we discern the pattern.

Towards computational patterns

By starting the discussion of patterns with the interpretation of behaviour I may have misleadingly seemed to exclude other sorts of patterns. Patterns are everywhere: there are patterns in stars, wallpaper, pavements, bacterial leaching, my cat's daily outdoor rounds, the keyboard with which I write, and so on. All propositions with the exception of proposition (1) and (2) also hold true for these patterns. I started with patterns in human behaviour (including its results) for the simple reason that the humanities are concerned with these. The question now is: do these propositions hold for patterns found using computational techniques? Of propositions (5), (6), and (7) we have already said that they do. Proposition (3) clearly does so too. Proposition (4) is concerned with individuals perceiving patterns in data. I do take this proposition to hold true for patterns found by computation in that in the same set of data different individuals can find different patterns (using computational techniques) which do not necessarily count as disagreements. This leaves proposition (1) and (2).

How do proposition (1) and (2) relate to patterns found by computation? The key to this question is the notion of *event*. Events are what agents bring about or undergo. If

[9]Berry (2011, 13) adds that computation also allows 'the modularisation and recombination of disciplines within the university itself'. The latter is evident, considering the rapidly expanding field of the so-called digital humanities.

[10]This is the central theorem of the so-called narrativist philosophy of history. Mink writes (1966, 39): 'despite the fact that an historian may "summarize" conclusions in his final chapter, it seems clear that these are seldom or never detachable conclusions; not merely their validity but their meaning refers backwards to the ordering of evidence in the total argument. The significant conclusions, one might say, are ingredient in the argument itself, not merely in the sense that they are scattered through the text but in the sense that they are *represented by the narrative order itself*' (his emphasis).

patterns alert us of events under a description, as proposition (7) holds, then the patterns found by computation too are related to human behaviour in the sense that patterns alert us of events under a description and events are what human beings bring about or undergo. My argument is that we also take the intentional stance towards patterns in data found by computation. Without this stance, as the examples discussed below will show, the data would not make sense.

One problem now seems to be this: if patterns are patterns in behaviour and such behaviour presumes rationality, i.e. agents having attitudes, beliefs, and desires, then patterns are within the agent's grasp, but some patterns found in data presumably are not. I take it, although I will not argue for it here, that this is so; but since data in the humanities is always the *result* of behaviour, a pattern found that goes beyond the agent's grasp refers back to or requires behavioural patterns that *are* within his grasp, and can be confirmed or disconfirmed by that data.

I will now discuss some examples of patterns found by means of computation that confirm the points I just made. In addition, this will give us a glimpse of what computation in the humanities is like and an eighth and last proposition on patterns. The examples chosen are fairly easily comprehensible and concern homogeneous datasets, where homogeneity is defined as being relative to the purpose to which the data is put to use. Furthermore, the examples all concern machine readable linguistic data. Only a very tiny fraction of the evidence that scholars use consists of such data. These limitations do not affect, I think, the truth of the propositions on patterns.

Culturomics

Erez Aiden and Jean-Baptiste Michel, who, with Google, developed the Ngram Viewer, a tool which was released in 2010 and visualizes the frequency of words in millions of books over time, in their recent book discuss several interesting experiments. One example is the pattern they found on the relation between certain occupations and being famous. Actors for example, tend to be famous somewhere between their late twenties and early thirties whereas politicians only become famous at a much later age, sometimes even when they are already in their sixties. Their research also shows that authors tend to be more famous, if they become famous at all of course, than actors, but less famous than politicians. (Aiden and Michel 2013, 112–114). The relation between occupation and age of being famous is found by counting the *mention* of famous people in books. If a famous actor makes a new movie, we can count on it that it will be mentioned. I want to emphasize that such relation only makes sense if we relate it to behaviour – mentioning famous people in books; behaviour associated with being an actor, politician, and author; watching movies; reading novels; voting for politicians; and so on. We may add that the Ngrams show only those who *have become* famous, not those who *became* an actor, author, politician, *hoping to become* famous but did not.

An interesting historical case that Aiden and Michel discuss concerns Marc Chagall, who, in March 1924, wrote in a letter that he believed that his 'image' was fading in Russia, which he had left for Paris in 1923, while he was becoming noticed in France. Aiden and Michel show an interesting chart that confirms that Chagall was right in the effect of his immigration from Russia to France (Aiden and Michel 2013, 125–126). The pattern found is that 'being known in some country' is related to 'living in that

country'. To be known one presumably has to be able to make oneself known. Whether this pattern can be generalized or not is not our concern here. Of interest is that what Chagall believed to be true is confirmed by means of computational techniques. Chagall anticipated the behaviour of his fellow human beings on the basis of the pattern just mentioned, as proposition (1) dictates, taking the intentional stance, as proposition (2) states. He was able to describe the pattern efficiently in his letter (3). Computation techniques confirmed the pattern (6), and did so efficiently, for confirming it 'by hand' would be far more laborious (5). Next Aiden and Michel show a Ngram that unmistakeably visualizes the effect of Nazi suppression and censorship in Germany (Aiden and Michel 2013, 132). Again we could elaborate on the pattern found using our propositions on patterns.

Perhaps we may object that an Ngram shows a *trend* rather than a pattern, a direction rather than a sequence. Of course, trends and patterns are closely related, for the trend that the chart shows is an increase or decrease in frequency of words per year. The objection holds however, but prompts us to realize that a trend requires reference to its underlying pattern if the trend is to be explained. This is our eighth and final proposition on patterns.

(8) A trend requires reference to an underlying pattern if the trend is to be explained.

Counting the frequency of words in millions of book gives us a sense of what computational methods to identify patterns can be like and what knowledge they offer.[11] This field of knowledge production is called 'culturomics' by Aiden and Michel. There are many other interesting examples of course. Here I am in particular thinking about the search for discursive patterns using topic-modelling (a.o. Goldstone and Underwood 2014; Underwood 2014). Word-frequency over time is the most basic way of 'computing the past' – searching for co-occurrence of terms is already a bit less basic. New methods of natural language processing focus on tracking the distribution of terms across (con)texts, constructing semantic networks and shifts therein over time, and algorithms making clusters of terms ('topics') that tend to occur in the same context. The patterns ('topics') thus generated may be surprising, especially if they are not searched for and are the resultants of the algorithms used, offering what Alan Liu has called 'tabula rasa interpretations' (Lui 2013, 414). These 'tabula rasa interpretation' are at best initial interpretations – if they even can be properly called 'tabula rasa interpretations' – in that their meaning depends on how humans interpret them (Lui 2013, 415). The patterns found using methods of natural language processing too are in agreement with the eight propositions on patterns discussed here.

Distant reading

Let me conclude our discussion of patterns with the discussion of one more example, this time from literary history: Franco Moretti's 'reflections on 7,000 titles' of British Novels from 1740 to 1850, which is an interesting example of the (new) use of computation in

[11] But we are not to forget the lesson of Fogel (1964, 249), one of the main advocates of quantitative history in the 1960s and 1970s: 'Only the scholar who knows what is *unique*, *special*, and *particular* about a given historical problem can successfully adapt powerful general methods to the study of that problem. The casual interloper cannot possess this knowledge.'

the humanities.[12] I will only discuss the first of three studies that Moretti conducted on those titles. His first study is concerned with the length of titles (the second with clusters of types of words in titles; the third with formulae used in titles). My short discussion will not do full justice to Moretti's work, but again makes clear what computation in the (digital) humanities can be like.

Quantifying the number of words used in titles yields the following results: 'the median oscillates between ten and twenty words for the first twenty-five years; it drops quickly to ten, around 1770; then to six by 1790; and it remains there (with minor ups and downs) until the mid nineteenth century.' Moretti further observes that 'titles don't just become shorter, in the course of 110 years, they also become much more similar [in length] to each other' (Moretti 2013, 182).[13] Moretti then gives the following explanation for his findings. First he observes that the number of novels published in Britain in the period under consideration 'grew dramatically'. This changed the 'ecosystem', for as a result of this growth, 'magazines started to publish reviews of many new novels, making title-page summaries somewhat superfluous (…) and it became vital for a title to catch quickly the eye of the public. Summaries were not good at that' (Moretti 2013, 186).

The eight propositions on patterns we identified above hold in light of this example. Proposition (7) tells us that patterns or trends, as proposition (8) makes clear, alert us of events. The decreasing length of titles alerts us to magazines starting publishing reviews and certain demands of consumers. Here too the patterns are patterns in behaviour – shortening titles, writing novels, writing reviews, consumers buying novels – which are explained by taking the intentional stance, for authors, their editors, reviewers, consumers, are taken as having intentions, beliefs, wishes, and other propositional attitudes, as propositions (1) and (2) dictate. Moretti found efficient ways of describing the pattern (3) he discovered using computation (5), and this includes the graphs he uses. Maybe it could have been found by hand, but that would be much more laborious. Other patterns may be found (4) and further research may confirm or disconfirm his findings (6).

Moretti's overall conclusion is that all of this shows '*the force of the market*: how its growth creates a major constraint on the presentation of novels' (Moretti 2013, 192). Here the publication of novels becomes part of a *development* – the force of the market – that is only properly understood in retrospect. Here Moretti *begins* to formulate a historical conclusion (thesis) that instead of leading us to past reality, as the patterns he found do, draws us out of it towards its comprehensive narrative understanding. For although the growth of the market can be described as accurate as the best methods available allow, and its effects on the presentation of novels can be measured as precisely as is possible, at some point Moretti has to move away from all that and retroactively align his evidence, and then the past actions and events associated with novels start to exemplify a social change, which his narrative turns out to be all about (van den Akker 2012). This Moretti only has to do if his aim is to understand the publications of novels historically. Patterns, as proposition (7) stated, do not oppose narrative.

Moretti writes that he wants 'to come up with a new sense of the literary field as a whole'. He points out that it is already difficult to know 200 novels, but knowing

[12]'New' use because one cannot be but impressed by the 'old' use of quantitative methods in the humanities. See for example Le Roy Ladurie (1966).
[13]His other studies show other and more interesting similarities.

20,000 novels is a different matter all together: 'A larger literary history requires other skills: sampling; statistics; work with series, titles, concordances, incipits' (Moretti 2013, 67). Moretti is right, of course, that computation allows for new methods that enables the study of sets of data that cannot be studied manually, and he is also right that our sense of the past will change as a result of it.

It goes without saying that information technology allows the discovery of (new) patterns in data, and there is much we can expect from new methods and techniques of discerning patterns. They allow scholars to answer new questions, widen the scale of their research and the scope of their generalizations, be more rigorous and systematic about their approach, and be more nuanced and precise about their interpretations (Goldstone and Underwood 2014). The new techniques that Moretti talks about are not meant to replace traditional methods of doing research in the humanities: rather they complement and enhance them (cf. Kitchin 2014, 7–8). One reason is that patterns require interpretation. Another reason is that the pattern found by computation in a large dataset ideally prompts the scholar to (re)consider individual exemplary cases, which he or she traditionally is accustomed to study (Manovich 2016).

Conclusion

In this paper my aim has been to clarify what patterns are and to what purpose scholars may use them. To this end eight propositions on patterns were formulated. I argued that we should take the intentional stance towards patterns found in behaviour, regardless of whether the pattern is found by hand or by computation. Taking the intentional stance towards behaviour enables scholars to explain that behaviour (we also saw that taking the intentional stance towards behaviour is something we constantly do in our every life – there is little to expect from taking the intentional stance towards such things as coffee machines and trees. Our pets on the other hand do benefit from us taking the intentional stance towards them).

Another reason to emphasize the intentional stance in the context of pattern recognition is that it opposes the view held by some – for example by Aiden and Michel in the book I discussed – that the use of computational techniques in the humanities make 'a predictive science of history' possible, and positively answer the question whether 'culture obeys deterministic laws'. Apart from the fact that 'deterministic laws' is a pleonasm, the conclusion they arrive at is disappointing. It reveals how they think about the sciences and the humanities and how they are related. Aiden and Michel present themselves as being very cautious about the claims they make, adding 'Maybe, just maybe' before each of the statements I quoted. As if to balance their views, they add that as against these claims, using a quotation of the anthropologist Franz Boas that says that the historian is interested in facts rather than general laws, 'Sometimes, you want to look at a chart. Other times, you want to curl up with a good book' (Aiden and Michel 2013, 211–212). Aiden and Michel do not seem to realize that what they write is rather condescending: not because of the uninformed and oversimplified characterization of the historian's interests – as if they are only interested in facts and if there is no other option than either be interested in facts or general laws – but because of their work as something that satisfies a desire to curl up. Their conclusion is also disappointing because it implies a return to the belief of 'nineteenth-century social theorists that there are

laws which determine the direction in which any society or institution will tend to move over the course of time', as the noted philosopher Maurice Mandelbaum put this view (Mandelbaum 1971, 113). All those humanities scholars discussing these issues, and all histories ever written, are put aside by them, as if they are irrelevant for *their* view on the humanities – books of humanities scholars are presumably of interest only to count the frequency of words used in them. Moreover, the patterns they found – which are very interesting – are far removed from laws that determine the direction in which any society or institution will move, and our discussion of patterns in the humanities, including those found by them, is far removed from the dichotomy of facts and general laws they erroneously assume to adequately represent the distinction between the humanities and the sciences. I do not take Aiden and Michel to be representative of how (computer) scientists think of the humanities, but I cannot understand how they could arrive at such conclusions on the basis of their research. The patterns found by Aiden and Michel require the intentional stance if they are to make sense and taking this intentional stance is also what they do when they *interpret* the patterns they found. It is one thing to say that computation introduces new methods and techniques into the humanities, which are generally more systematic and rigorous than traditional methods and techniques, change the scale and scope of the research, allow interpretations to be more precise and nuanced, and provide patterns which would not have been discovered otherwise. It is another thing to say that these methods and techniques turn the humanities into a (predictive) science of culture and society.

Patterns are of interest to scholars because they explain behaviour, not because they explain the direction of societies. The argument that the patterns detected by means of computation require interpretation is not something digital humanities scholars and theorists would find surprising and they have argued for this themselves (Ramsay 2005; Lui 2013; Goldstone and Underwood 2014). I have provided a systematic notion of what patterns are and used for, and this notion explains why patterns found by computation require interpretation. In this paper I argued that both patterns found 'by hand' and patterns found 'by computation' are part of an intentional system. The introduction of computational methods in the humanities therefore does not change the humanities in *this* respect.

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Notes on contributor

Chiel van den Akker is assistant professor philosophy of history in the department of Art and Culture, History and Antiquities at the VU University Amsterdam. He is interested in philosophy of history and science, contemporary historiography, and digital culture. He received his PhD in philosophy from Radboud University Nijmegen (the Netherlands) in 2009 with a thesis on the nature of historical representation.

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