Digital Humanities and Hermeneutics

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Introduction

In the humanities, in computer science and in media a new kind of science is extensively discussed which is called 'digital humanities'. The term 'digital humanities' has a flair of a scientific revolution. The new idea would be to ground science on information: humanities would become a part of computer science. We want to analyse this matter in a more detailed way from the viewpoint of the philosophy of science. For this, we will clarify an important research method which is commonly used in the humanities, hermeneutics, and we will integrate the new concept of digital methods used in humanities at the appropriate level.

1 Scientific knowledge domains

For this end, we should first with several sentences summarise the basic ontological view which we use here.

The world exists of events. Events by themselves may consist of other, more special events. Analytically, the set of events can be divided in four, not disjoined kinds: events, event types, language events, and common events. An event type is a (more or less structured) set of events, a language event is an utterance in the widest sense which refers to parts of a language, and a common event is an event in which several persons are willingly involved at the same time.

We further divide events into three kinds which also are not disjoined: *simple events* which can be observed by persons, *bodily events* which take place in a person, and *internal models* which are built up in a person and in her mind. An internal model represents 'the' environment of a person and a part of an internal model can be regarded as an 'image' or a representation of another event. Among events, there are those which are *stable events*. A stable event does not change over time. Nevertheless, they are created in some way and will somehow dissolve. Some stable events can be called *things* or *objects*. For instance, a book is a thing, an event which is produced and will dissolve after a while. Images and representations can be regarded as 'limit' events; they are events which looks rather stable.

Bodily events can consist of parts from different levels; one part can be a physical part, another one a change of state, and another a stable thing. Some special results of bodily events, which we call *bodily movements*, take place mainly in the brain of persons. Bodily movements are parts of complex processes. At the moment, they are not completely understood. Relative to a person, we distinguish three kinds of bodily events or processes: *short time images*, *long time images*, and *states of memory* (Sporns, 2010) – all these processes happen in one person.

For us, six relations between events are important, namely, *observation*, *transformation*, *fit*,[1] *integration*, *utterance*, and *refering*. In Figure 1 we depict these kinds of events and their relations:

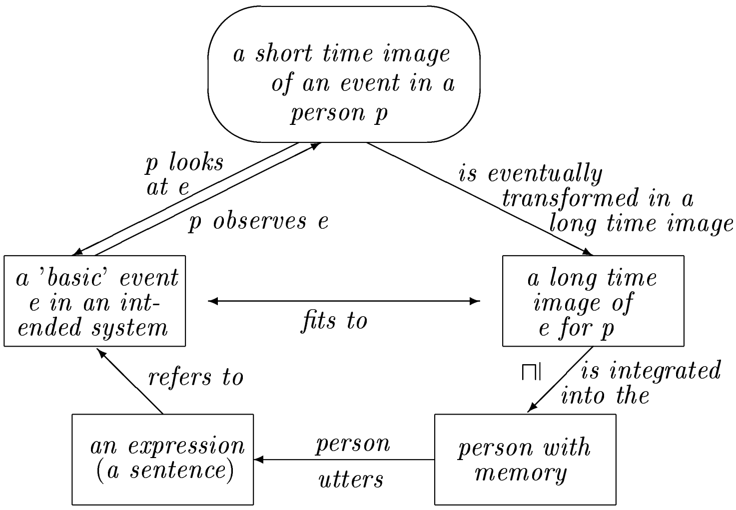

Figure 1: A circle of events in a person

For instance, a basic event e which is not further analysed by the person, is observed by a person and is 'depicted' as a short time image in her brain. Special classes of observations constitute an event type. A short time image *can* be transformed to a long time image in the person. A long-time image has the property that the person *can* remember – if she wants to – an event which she had observed in history. The transformation from a short- to a long-time

[1] A special subrelation of *fit* is *understanding*.

image can be described as a process which takes place in the body of the person. These processes take place permanently and unconsciously in the brain. The relation of fit has a more theoretical status; it can only be understood if it is characterized by a more complex model. A long time image – which is a part of an internal model – can fit to an event. In the basic sense, a long time image fits to an event which is not further analysed, to a 'basic' event.[2] A long time image is integrated into the memory, into the brain, into the body, and therefore into the person. This process also is not well understood at the moment. A big part of integration happens at sleep.

All the integrated long time images are central parts of the construction of the internal model of the person. From the internal model, a process can be started, the person utters an expression e^*, for instance, a sentence. Such an expression can refer to an event – in the basic sense: an expression e^* refers to the basic event e. This leads to a kind of circle: from e to a short time image, to a long-time image, to the memory, to the person and finally to an utterance e^* which refers to *this* event e.

Event types are essential for using and learning a language, and for speaking. A person can collect short- and long-time images of events, and unite them to sets of short time images, and sets of long time images. How this happens in detail is not really understood. From several observed events of a similar kind, the person creates an *event type*, a collectivity of events. It is known that parts of the structure of the brain can be described in layers or levels. Images of basic events lie in a first level, event types in a second, and in further levels we can find other images or representatives for more complex entities, like memory, internal model, symbol, expression, person and even more complex processes like utterance, observing and referring. All these images are represented scientifically by neural networks.

A circle which is described at the level of events can also be reproduced at the level of event types. A person can observe several events which all belong to a bigger event which also is observed – and all this happens at the same time. The person, for instance, observes a car moving with four persons where two fight with each other.

If a person utters a sound or expresses something by a bodily movement, counterparts of such utterances exist in the brain. Utterances are collected to event types, and symbols are invented for such event types. From such symbols other words, sentences, phrases and other terms can be constructed. This leads to complex processes of learning a language. Words and sentences exist at the level of tokens and at the level of types. Event types can be stable, they can be things, like written words. Words, sentences and other terms are written and stored outside of the body of persons. Circles which we discussed at a basic

[2]Whether an event is basic depends on the situation of a person which receives it.

level, exist also at other levels. A written sentence is observed, transformed and integrated, and the resulting long time image can yield an utterance which just refers to this written sentence. This often implies that the sentence was understood by the person.

This leads to language events. A language event is an event which is used in a language. A language event can be an action, like uttering, hearing, seeing, or a representation, like the word 'utter', the sentence 'Peter says something' or the process of formulating a sentence. A language contains many different entities, like sentences, words, phrases, terms, letters, and all these entities themselves can be regarded as events: language events. Written terms are things. Nevertheless, they can be regarded as borderline cases of stable events, they do not change – for a while.

At the level of tokens a symbol, like a written word, can be constructed in such a way that it refers to many different events which are approximately similar to each other. Many of these symbols can be used to refer directly to event types. Such symbols are the building blocks of natural languages. For instance, substantives represent sets of events, and verbs represent action (event) types. The point is, that a substantive or a verb refers to many different events which are nevertheless approximately similar with each other – for one person or for a group of persons.

A language event s which describes a phrase can lead to a hermeneutical circle. An event e is observed by a person, a short time image is generated in her body. In the positive case, the short time image is transformed to a long time image, and it is integrated into the internal model of the person. At the level of tokens she can, if she wants, construct or build a phrase (for instance, a sentence) s which on the one hand will refer to the event e and which on the other hand is a part of her internal model. This phrase can be described as a token or as type. In the latter case, the phrase is described as a language event, as a set of tokens. Such a language event refers to an event which can be approximatively true. This can lead to the situation that the observed event e can be a phrase which can be described as a process of writing the phrase down at this moment, and which also is an element of a set of tokens which constitutes an event type. The event type can contain the phrase which is built in a process of writing. So it seems that the event e and the event described as a phrase s which is in the process of writing (the language event), can be identical, even if these both events do not happen at the same point of time. We think, this is a kind of hermeneutical circle. Two events are represented in the same way but they do not exist at the same time.

Common events can be characterised as follows. A group of persons speaks the same language. We represent here a language in the most simple way; a language consists just of a collectivity of phrases or sentences which are united by certain language rules. In the notation introduced, a common event is an event type which satisfies two conditions: the elements of the common event, which are themselves events, are bound together by a language, and several persons are willingly involved in the common event (Tuomela, 2013).

The first condition can further analysed as follows. We take two persons p, p' of a group and two events e, e' from one event type. Two events e and e' for persons p and p' are only *common*[3] if e and e' are similar to each other and if there exists a phrase s of the language of the group, so that p observed event e, p' observed event e', and so that event e is approximatively truly described by p and s, and so that event e' is approximatively truly described by p' and with the same phrase s.

Informally we can express this as follows. There exist events which are perceived by two persons and their information about these events are communicated and are understood in the same way. This means that this 'one' event is represented in two internal models of two persons. The short- and long-time images of the event are for both persons not really the same, but they are similar. Both persons can express 'this' event. This means that both images are slightly different, but they can be uttered by the same phrase in the same language. Two similar events can be described by the same true sentence.

In this account, phrases (or sentences) constitute the most important medium. Persons communicate and agree by using sentences – at the level of tokens, and also at the level of types. Written phrases store information about events and event types on several levels. In this way, persons can build their internal models in such a way that a person takes parts of internal models of other persons of the group into account. The internal models of persons from one group are similar to each other.

This is true for the most kinds of events which are internalised in group members. They use similar phrases (words, sentences, terms) for similar events of the same kind. They say: 'This is mid summer', 'This is my house', 'Our city is polluted', 'The mayor wants to keep the streets clean', 'His friend got a job', 'Our priest will marry Peter and Rose'.

If persons of a group have special interests they will also use additional terms, including terms for the relations introduced above (observation, transformation, ...). Such persons have scientific interest. In a language certain terms are used by a group to investigate a special domain of events. This is also true for special domains of science. A scientific notion used, is anchored in a small list of paradigmatic real systems which are investigated in the beginning. After a while, a group of researchers also invent special terms for the systems they observe, for the elements of such systems, for the special methods used, and for special hypothetical models which represent those real systems.

[3] They are in the possession of both persons.

At this point, we must introduce the notion of probability because nearly all scientific knowledge domains today are affected by chance. A description of an event is normally not too simple and not too complex, it should be just appropriate. In science, this leads to the use of probability theory. An event is not just true, it is true only with a certain probability. If chance and probability are used in a scientific way events are described by *random events.* A random event can be represented by an event type. A random event is described by a set of events, or by a 'sentence which contains variables'.[4] To explain chance, besides random events, a second kind of event is needed. Events of this kind are called results, outcomes, or samples.

At the moment, Bayesian nets are used by which information about events are stored and updated. The short- and the long time images of a person are represented by Bayesian nets. Such images can be described by sets of knots (synapses) and lines (nerve cells), i.e. by nets.

In probability theory, a real number α is assigned to a random event e. In most simple cases such a number can be defined or determined by counting two numbers: the number n of possible results and the number k of results which really happen. The probability of the random event e is in such cases defined by k/n: k, the relative frequency in which the events of the event type really happen, and n, the number of all possible results (or events) which are known – relative to a given situation.

In the described circle, probability can enter at several points. All the acts of observation, transformation, integration, utterance, referring are uncertain. If we want to describe such processes scientifically and in a detailed way, probability notation can not be avoided. This is also valid for the theoretical relation of fit. In the philosophy of science the notion of a theory contains the notion of approximation as a central part (Balzer, Moulines, Sneed, 1987, Chap. VII). In a Bayesian network, a part of a long-time image can be represented by a point which is interpreted by the quantity or extension of this point. Such a quantity just means the number of activations of this point: the frequency of activation.

2 Sciences and Humanities

In the english language, scientific disciplines are partitioned into sciences and humanities. In many other languages, this distinction can not understood easily. Is a scientific discipline from the humanities not a part of science? This question leads to the distinction of styles of words but it also lurks at a deeper, philosophical level. Offensively formulated: are sciences and humanities ranked by the process of name giving? Is a domain from humanities second class?

[4] In normal language, variables are not used explicitly.

Some of the existing scientific domains have well established names, like physics or sociology. Others have still more volatile status. Researchers in such a knowledge domain often fight with each other to establish the one, accepted name. Is, for instance, 'systems theory' the same as 'philosophy of science', or is 'cognitive science' a part of psychology?

Looking to the history of science we see that this question was always discussed. But this matter is here not at issue.[5]

In a wider sense, humanities contain disciplines, like linguistics, literary studies, philosophy, *Geisteswissenschaft*, history, arts, but also psychology, educational theory, geography, social sciences (sociology, political science), economics, game theory and decision theory. How are humanities distinguished from sciences? The term 'humanities' comes from the term 'human being'. Domains from humanities are mainly concerned with systems in which human beings, actors, are essential parts of such systems. Such systems contain language components, human products, dictions, human styles etc., where other disciplines are mainly concerned with systems in which persons and languages are not *essential*.

All scientific domains can be represented by scientific theories. A scientific theory consists at least of five essential components: a class of potential models, a set of intended systems (or intended applications), a class of models, an approximation apparatus, and a relation of *fit*. We describe here these components in the simplest form.

A model is a representation, an image, for a special kind of systems which is formulated in normal or formal language.[6] It has to be noted that the notion of a model is used in science in quite different meanings which we can not discuss here (Koporski, 2017). Potential models are representations which include entities of a 'more general form'. An intended system is a real system which is investigated intentionally by a group of researchers. The most central parts of intended systems are the facts or data.[7] A fact is an event which is real, and this means that at least a major group of scientists have a strong belief about the existence of the event, and the event is described by a linguistically

[5]This question was in-depth discussed in the literature. In the classical greek period we find, for instance: metaphysics, logics, mathematics, rhetorics, in the middle ages, for instance: philosophy, theology, law, medicine. In the 17th and 18th centuries chemistry and biology are added, and in the 19th century electromechanics, psychology, sociology, linguistics, and today: quantum physics, bio-chemistry, computer sciences – plus formal sciences: mathematics, computer languages are found.

[6]Many different forms of notation are used. For instance, formal languages can be used, like first order language, a language for set theory, or a computer language, like PROLOG or C^{++}.

[7]It is interesting that computer scientists use the term 'data' in a more general way. In computer science, a datum is just a term which can be inserted into a computer program. We use here the terms 'data' and 'facts' in the normal way, i.e. they are synonymous.

simple-structured phrase. An approximation apparatus consists of two components which can be described by *similarity* and *probability* (or chance). The relation of fit says that an intended system and a model fit together approximately if they are similar in a certain degree. The most of these components are described in detail in the literature, for instance in (Balzer, Moulines, Sneed, 1987). In this paper, we use the notion of a potential model in a more general way. A potential model also can be a part of a model.

Similarity can be described by a distance function d, so that two entities x and y are similar to each other with degree α if and only if the value $d(x, y)$ is smaller than α. The notion of distance function normally does not include a maximum value for distance. In empirical applications, often a boundary b is added which is used for practical reasons. Two entities are similar to each other in a special degree if the distance of these entities is smaller than b: $d(x, y) < b$ (Bourbaki, 1961). In a similar way, probabilities can be described. A class of sets of entities is given, and a function p assigns some of these sets E a number α: $p(E) = \alpha$, the 'probability of E' (Billingsley, 1979).

Models contain several components: base sets, auxiliary sets, and relations, where relations are partly structured in a constructive way. A relation can be a part of a base set, it can be a subset of a cartesian product which is built by two already constructed sets from the base (and auxiliary) sets, or it can be a subset of a power set which is built by an already constructed set from the base (and auxiliary) sets. Relations are distinguished into functions, constants and 'pure' relations. These components normally are not described in a formal way but in natural language – enriched by technical terms.

Besides these components of theories which are described in a detailed way in the literatur, there are many other components which are less precisely formulated. For a theory, methods, groups of people, languages, experimental devices, internet, statistical procedures are important. All these components change over time, a group builds, maintains, changes, and improves a theory.

Some general, basic, structural and methodological assumptions which are found in the last 50 years can be said to be approximatively true or valid for *all* scientific theories.[8]

A model for a special theory, for instance, a model for the theory of balance by (Heider,1946), can be described by a set of actors, a set of objects, an auxiliary set of numbers ('points of time'), and a relation ('to like someone or something') between persons or objects, at a special point of time.

To a scientific theory, there also belongs a way or method of coming from real systems to perceived models. For this procedure, the notion of fit can be

[8]Some of them were developed in a subdomain of physics and set theory (Sneed, 1971), (Balzer, Moulines, Sneed, 1987), (Bourbaki, 2004), others were generated in philosophy of science, like (Popper, 1959), (Kuhn, 1970) or (Kitcher, 1981).

used. A model can be fitted to an intended system. This can be described in the following way. The intended system y has to be described in the same format as the model x. Some elements of base sets, 'parts' of relations, and if necessary, also some elements of auxiliary sets, can be determined or measured. A part of a relation can just be an instantiation of the relation, or it can be a function value, if the relation is a function. For instance, the part 'Peter likes Rose' is an instantiation of the relation of 'liking'. All these elements can be united into the system y, the intended system of the theory. In this procedure, the scientists try to find a submodel x^* of x which is similar to the intended system y. At this point, the approximation apparatus comes in. If the probability that y can be embedded in a submodel $x*$ of the model x is high, the researchers will agree that the model x approximately fits to the intended system y. We summarise this in Figure 2.

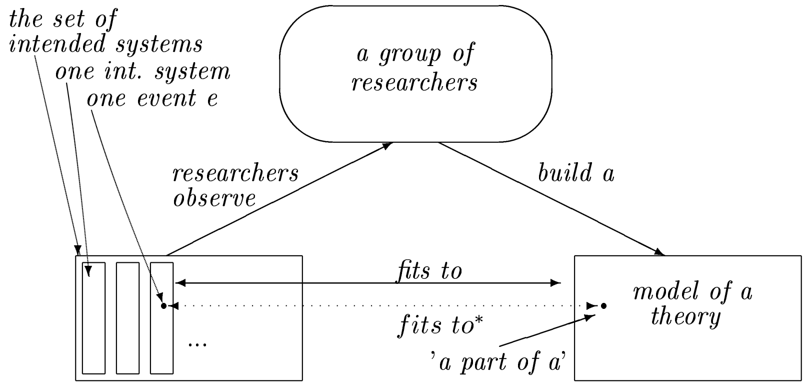

Figure 2: Intended systems, models and researchers

In Figure 2 two kinds of fit are depicted. Black arrows mean that the model can be fitted to one special intended system – represented by a smaller rectangle. The dotted arrows mean that a 'part' of the model fits to a basic event e.

These two notions of fit can be, on the one hand generalised to classes of models and sets of intended systems. On the other hand, they can be extended to internal models, memories of persons, or long time images of persons, and to common events, language events, event types and events. All these different versions of fit can be formulated by the components introduced in Sec.1.[9]

We are interested, especially, in the fit between a basic event which is a part of an intended system of a theory T and a long-time image of a person who is a scientist and a member of a group of researchers for the same theory T. The

[9]The structure of the levels of events leads to formal details which would need more space as we have in one paper.

long time image can be described by a neural, Bayesian net, and the event and several (including zero) 'parts' of it can be designated by words or phrases. It is possible to redescribe an event by a Bayesian net. Therefore the long time image and the event get a similar form.

This situation can be applied to all kinds of disciplines; in the sciences and in the humanities. In a physical theory, like astronomy, an intended system of outer space is investigated and modelled. Several researchers 'see' (mediated by observational methods) an event, say, a supernova, and the long time images of these researchers are very similar. If the event is reformulated by a Bayesian net and if the real supernova also is analysed in this way, all these events are in some way similar.

3 Digital humanities and hermeneutics

The word 'digital' comes from the latin word *digitus* ('finger'). Nowadays, in which computers and programming languages determine our life, the word also has the meaning of a sign or a token. At the hardware level of a computer, a 'digit' means a special position in space at which an information element can be put in, stored, and eliminated. These information elements themselves are called *bits*. *Digital* therefore now refers to a property of elements in the computerized world. This property was transferred finally also to other kinds of entities, like 'space', 'method', 'science' or 'humanities'. However, it is not really easy to understand what the term 'digital science' means. In which way can a science have the property of being digital?

As disussed, a science consists of different components. In normal words, a theory can be said to be simple, formal or dull; a system of notation can be complicated, effective or readable.

At a more concrete level, we find properties of scientific methods. A theory can be used in a practical or a theoretical way. A method of a theory can be used directly for the production of something practical or it can lead to new theoretical insights. Now, in some of the scientific methods also computer methods are used. When a computer method in an application of the theory is important or central, computer methods were ascribed also to theories. A theory becomes the property of being digital.

All this leads to scientific methods. A general description of such methods is difficult because there exist so many different kinds of methods. Some scientific methods are very general so that they can be applied to nearly every knowledge domain. For instance, simple applications of deduction are used everywhere. Of two premisses $A \rightarrow B$ and A, the conclusion B follows. This scheme is applied in all disciplines. On the other hand, many methods are so special that they are used only in one knowledge domain. For instance, the Hubble telescope is used only in astronomy, or the interpretation of a book written 500 years before is only used in literary studies.

Normally, a method does not generate an appertaining theory. A method and a theory are different entities. The notion of a method can be described by parts and components, of theories. Some of them were discussed above. A comprehensive description of scientific methods can not be given here, first steps see (Balzer, 2009, Kap. 4).

The oldest methods which are known in the history of science are not only used in the – today called – sciences, but also in the – today called – humanities. Ways of determining geometrical distances were known more than 3000 years. But also the interpretation of a legal document was known in the same period. For instance, legal rules established by the culture of Sumer had to be interpreted in the following period of the Hittite society. In measuring distances deduction plays a central role, and in a legal interpretation hermeneutics is essential. Today, besides of deduction and hermeneutics, also induction, machine learning, abduction, simulation and network analysis are used, and other, more practical or special methods are found in different disciplines (Hacking, 1983).

Today, methods also use the computer, they use 'digital means'. Facts are described in programming languages, they are ordered, prepared (formated, translated, filtered), stored and some times[10] also generated by computers. A hypothesis is formulated in a programming language, it can be tested by the computer, if the facts and the format of all entities involved, fit. There are also – still not many – computer methods to create new hypothesises and facts. There are digital methods for representation, analysis, change and interpretation of humanistic knowledge domains which use computational media like databases, archives, pictures or sounds. Such methods are applied, for instance, to text analysis, language learning or delivery and management of digital systems (Davidson, 2010), (Schreibman, Siemens, Unsworth, 2008).

It is not our intention to list of, or describe the different methods which use the computer in a systematic way. We only mention three of them. In *machine learning*, scientific rules (or hypothesises) are constructed, improved, or learned from facts by the computer, if the programming surroundings are suitable (Langley et al., 1987). In *topic modeling* (Blei, 2012), words or phrased in greater parts of large text corpora are automatically searched, found, compared and analysed, if the corpora are given in the computer system. By *data mining*, texts are screened so that a given term – a word, a term or a linguistic phrase – is found and stored, so that the computer can further use these items for comparisons, for embeddings or tests.

Such methods are used for different goals. Some digital methods can be ap-

[10] At this moment, killer robots, drones and embracing computer programs begin to model a 'new brave world'.

plied to the sciences and to the humanities as well. Constructing and applying clusters of data, comparing systems of data by using notions of similarity are used everywhere. Other methods are only applied in a special domain. For instance, in comparative literature, parts of texts are compared by special rules. In economics, preferences of persons are statistically determined by their internet activities. In psychology and political science, profiles and belief systems of persons are generated using data mining. It has to be mentioned that many of these applications are driven by economical, not by scientific reasons.

There are different approaches of handling facts in the sciences and the humanities. In the sciences, facts are often 'translated' into numbers or other mathematical entities. In the humanities it is of course possible to redescribe a sentence by a list of numbers but the opaque, human medium of beliefs which is often important is then 'forgotten'.

Before computers exist, facts are stored in libraries, and the hypothesises are found in the books and articles of the scientists. In 'old times' it was troublesome for a scientist to find facts which he has not at hand. The quantity of facts could be related to the number of works stored in a library. Often is was also troublesome to translate a text into another language. But we can not conceal that there is also a second, economically driven aspect in which facts are 'wrapped' in different ways so that these facts are not available to other scientists; they become secret (Duston & Ross, 2013). This happens, for instance, in biological field research, in pharmaceutics or in contemporary literary studies in which copyright claims are wrapped.

With the advent of computers, large sets of facts can easily stored, and shared, independently of the location and with a fraction of costs for infrastructure. Today facts are found from other places without labourious investigations, and the quantity of facts goes up exponentially. Many scientists, also in the humanities, communicate today through the computer. Furthermore it is true, that the format of storage of facts gets more elaborated. For instance, in two editions of a work the language rules can be different. This can also imply small changes of meaning of a work investigated.

In the last two decades, the term *big data* was created. This term describes large and complex amounts of data, which can not be analyzed with traditional ways of data processing (Dedic & Stanier, 2017). In big data, data are clustered, scaled, classified and compared with each other. Many such methods are not new, they are well known (Krantz et al., 1971), others are new. In big data, phrases are embedded in, and compared to other phrases. In comparative literature, for instance, this can be done in a quantitative way which what difficult in the past.

The new aspect which comes from the computer is the quantity of data and hypothesises. If a data set is really large, the just mentioned procedures would need more then one life time of one person. Different syntatical and semantic methods were used also before the computer exists. For instance in (Levi-Strauss, 1955) myths where collected and structurally investigated, or in (Propp, 1958/1928) a similar, but more formal method was used for systems of folktale. But the quantity of data, models and texts were small – relatively to what happens today.

In discussions about digital humanities it is often said that new digital methods lead to new answers, and that new methods make it possible to formulate new questions. This is certainly true. But this point applies to all scientific domains and for all scientific methods, not only for digital methods. What is new, is the quantity of facts and hypothesises which can be handled by the computer. This was not possible before the advent of the computer (Moretti, 2013). For instance, by combination of stylometrics (Kenny, 1982) and multi-dimensional, graphical representations, semantical change can be recognised in texts. The change of semantical aspects can be investigated using very many printed works from a language space. Or the style of the buildings in Paris are analysed by using 120 000 pictures and statistical methods of distance (Doersch et al. 2012). We can not survey the examples using computer methods which lead to positive answers.

All this shows real progress, and this is certainly true for the humanities. However, this does not answer our question why new subdisciplines from the humanities should emerge. The simple fact that parts of the disciplines from the humanities use computers can not generate a distinction in one discipline. In some subdomains of the humanities the use of computers gets more important than in others. But this does not mean that a subdiscipline gets so dominant that a new lable is invented. In other words expressed: Should some subdomains of humanities give up hermeneutics and should shift to computer analysis?

At the level of politics and power it is normal, that a knowledge domain gets bigger because the researchers like to apply their theories and methods also in other areas, especially if the discipline passes through a period of rich funds. Some economists had the idea to 'conquer' the rest of social science, some biologists had the idea to enlarge their domain to social systems (Maturana & Varela, 1980), or 200 years ago physicists had a world view by which everything in the world can be understood as mechanical systems.

If a theory just gets a new representation, the theory itself remains identical. Physics, for instance did not change into a new discipline, when all parts of physics were computerised. It is also not the case that a special kind of physics got a special name, like 'computer physics' or 'digital physics'. Similar stories could be described for other disciplines. We can neglect such political-scientific aspects here. Why should we dicsuss whether a science like literary studies generates a new branch 'digital literary studies', only because there is money for new computers and the appertaining staff?

With new digital methods several domains and disciplines evolve quite quickly at the moment. Three dimensions are affected. First, in the humanities the use of digital ressources (like: scanning of books, storing texts in computer systems in an orderly way) leads to a broader and clearer system of facts. Second, researchers from the humanities use now computer methods and apply these methods in different disciplines of the humanities. Third, new digital methods are created by researchers from the humanities, and these methods lead to new questions.

Considering all these aspects we think that the most important point here is the following. Let us return to the circle discussed above. The event of an intended system of a theory from the sciences *do not* contain the observers – at least in the normal way in which such theories are formulated. An observer from physics can not live in a supernova. In the humanities this is different. It is possible that a researcher from a theory from the humanities can really live in an intended system. The observer can observe himself. This leads to a real cleavage between the sciences and the humanities. This point is of course well known – at least in the humanities, for instance (Luhmann, 1998).

This cleavage can be exemplified by the simple theory of Heider. In Figure 2 an intended system which is investigated by Heider and his group is represented by a small rectangle at the left, and a model of Heider's theory is depicted by a rectangle at the right. One intended system fits to one model. If the intended system is analysed, the elements of base sets of this system are persons (from a group) or objects (which these persons could possibly like). Some of the instances of 'liking' can be determined in the real world. This can be done, for instance, in a scientific survey. Some of the persons will reveal some of there preferences, and others will not. In such a survey a researcher observes some persons, objects and some preferences ('liking someone or something'). At the level of events, at the left an event e and at the right a part of a model are depicted. This 'part' could be for instance an instantiation of the relation 'to like' which is described by 'Peter likes Rose'. But 'Peter' can also be the observer of this event.

We can now further clarify this point. In the formulation used in Sec. 1 we can specify the observer to be a researcher who observes events from an intended system of 'his' theory. From this starting point we can repeat the circles of a distinct person, a researcher, described in Figure 1 above. We depict such a circle which contains also some events from higher levels.

In Figure 3 some actions of a researcher which works with the theory and the appertaining set of intended systems, are depicted at the left side. Three intended systems are drawn by smaller rectangles. In one of the intended systems an event e can be seen which is a part of this system. The event is observed; this initiates a circle 'in' the researcher. A short time image of the event is created, and then, as this event is for him interesting, this image is transformed into a long time image. It is integrated into his memory and in his internal model. He activates again the long time image and utters an expression which shall refer to this event. This utterance e^* is also depicted. Both events e, e^* are similar ($\approx$) and there exists a boundary b. A long time image which is too far away from the event e it is classified as not similar to e.

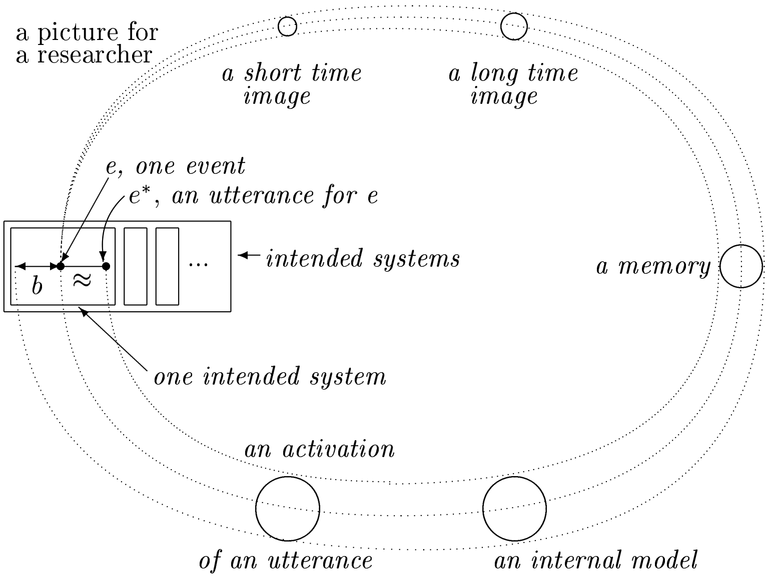

Figure 3: A circle of an event in a person

We suppose now that the intended system under study is the society in which the researcher itself lives. The researcher on the one hand observes himself and on the other hand he utters an expression. The point is that the person can at the same time observe himself and express this observation. If the researcher says 'I observe myself', the observation and the utterance seems to happen at the same time. The utterance 'reports' this act of observation.

One circle of this process is described in Figure 3. In reality this circle runs through very fast and quasi continuously. It is known that the human body can do more than one thing at the same time (Dennett, 1991). The interesting question is: depends a hermeneutical circle of the assumption that the point of beginning and the end point of the circle must occur at the same time?

In humanities, methods like hermeneutics and abduction play a big role, induction and deduction are less central. This is so because the content of human activities and their results are normally described in an informal way, formulated in normal language.

Conclusion

The term 'digital humanities' subsumes those disciplines and knowledge domains which are found in the humanities and which have subdomains in which the computer is important. 'Digitale humanities' means that in a subdomain from the humanities new methods of handling the content of the subdomain by the computer are used in a better way. The most important aspect is that the computer can handle (store, order, classify, transport) large sets of phrases (terms) used in natural language so that facts are easily accessible electronically for researchers.

A new kind of science – digital humanities – does not emerge. Only some new methods are added to the repertoire of methods, formulations and notations used in the humanities. These new methods are using computers. But from these methods there is a long way to go to use a hermeneutical method by the computer.

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