

Understanding Media Revolution – How digitalization is to be considered

Georg Rückriem, Claudia Ang-Stein, Johannes Werner Erdmann¹

Not only in public discussions but also in scientific discourse the concept of „revolution“ is increasingly used in order to characterise the importance of New Media in general and of smartphones and tablet-pc’s in particular. Above all those political independence movements in North Africa using mobile phones encourage this interpretation. On the other hand the international community of activity theorists remains now as ever very reserved facing this common meaning. Our contribution is to examine whether this reservation is necessarily based on activity theory or whether there is possibly an interface between activity theory and present media theory. Aiming at this purpose we check the central concepts like medium, revolution, transformation, and transition and so on. Our hypothesis is: With the help of an epistemic understanding of medium we may understand the ongoing process of New Media Development a media revolution.

1. Introduction

Witnessing the global spreading of internet networks including web 2.0 services, and observing its assessment by present public opinion as well as scientific community, we notice a growing interest in sound argumentation and methodology towards a modelling of this process through activity theory in particular. More precisely, as for the general impact of New Media² the scientific discourses of activity theorists seem to lack theoretical clarification even of concepts, which are most commonly in use. Our central question therefore is: Is it correct to call the

¹ [Leicht veränderte und erweiterte Fassung unseres Vortrags auf der Summer School in Helsinki 23.- 25. Mai 2010 und der Summer University in Moskau 18. – 21. Oktober 2010.]

² We use this term instead of all those similar expressions like e.g.: „the computer“, „the internet“, the computer based networks or social services, the ICT or information and (tele)communication technology etc.

ongoing spreading of New Media a revolution? And if so, what does that mean to us and what does it mean to learning and learning institutions in particular?

But instead of plunging directly into the immense and unmanageable discussion on “computer and learning” we at first try to understand what the term of New Media stands for. What are “media”? And what is new about them? Is there any difference between digitalization and all those technical devices based on it? Is technology and “medium” all the same? If not, what is a medium?

But if you start asking the New Media discussion for clearness of notions you will immediately meet the same vagueness concerning the term “revolution”, and come subsequently to the conclusion that any quest for understanding “media revolution” has to start with the definition of its basic concepts.

Therefore I’ll present our findings and arguments with some short theses based on four theoretical definitions concerning:

1. What is a medium?
2. What is a revolution?
3. What is a medium revolution?
4. What is and why do we need a transition theory?

Based on this theoretical framework I try to show its benefits for concrete empirical studies especially in the field of learning.

2. What is a medium?

2.1. Digitalization as technology³

Let us start with a look into some internet dictionaries:

“The term digitization is often used when diverse forms of information, such as text, sound, image or voice, are converted into a single binary code.”

“Strictly speaking, digitizing means simply capturing an analogue signal in digital form.”⁴

³ Also known as digitising or digitisation, digitalizing or digitalization, and digitalising or digitalisation; see American and British English spelling differences.

“Digitization is the process of converting information into a digital format . In this format, information is organized into discrete units of data (called bits) that can be separately addressed (usually in multiple-bit groups called bytes). This is the binary data that computers and many devices with computing capacity (such as digital cameras and digital hearing aids) can process.”⁵

„Conversion of analogue information in any form (text, photographs, voice, etc.) to digital form with suitable electronic devices (such as a scanner or specialized computer chips) so that the information can be processed, stored, and transmitted through digital circuits, equipment, and networks.”⁶

In short: „The noun digitization has 1 sense: Conversion of analog information into digital information.”⁷

We remind those definitions to make our first conclusion feasible: We should distinguish between technology and its applications.

Digitalization actually is the basic technology for almost all technical devices in every field of our daily life, not only for computers or all kinds of New Media but for industrial robot machines in every field of production, as well as for planes, cars, dish washers, flat irons, refrigerators, toasters, even postcards and every chip using tool.

That is, by the way, why they had been called “intelligent objects”⁸, “smart objects”⁹ or “smart artefacts”¹⁰ already long since and why Mark Weiser spoke by

⁴ <http://en.wikipedia.org/wiki/Digitalization>

⁵ http://whatis.techtarget.com/definition/0,,sid9_gci896692,00.html

⁶ <http://www.businessdictionary.com/definition/digitization.html>

⁷ <http://www.audioenglish.net/dictionary/digitization.htm>

⁸ “Knowledge based intelligence, inherent in widely used technologies like tools, cars or telephones, means that users of that technology normally are not expected to know and often actually do not know how these technologies function, that is, which specific technology has been installed in them. It is sufficient to know how to use those devices.” Helmut Willke 2002, 25 (Translation into English by G.R.) This argument of a “collective intelligence” emerging from global digital networks is the fundamental reason make Willke speak of “knowledge society” as a new societal formation.(See Willke 2001, 78ff.; 202, 10ff.)

⁹ Streitz 2007a, 2007b

¹⁰ Rheingold, H. (2002): Smart mobs. The next social revolution. Perseus books.

1991 of “ubiquitous computing”¹¹ or Norbert Streitz of the “disappearing computer”¹² within our daily life changing it into a “smart environment”¹³ or “intelligent ambient”¹⁴.

This means that if there is something revolutionary it is then the digitizing technology itself while New Media, internet and all its applications in web 2.0 social services are not. They are nothing but appearances of this revolutionary technology of digitalization.

2.2. Technology and medium

Our second conclusion seems to be obvious: There is no medium without (tool or) technology. But this is not true for the contrary. Not every technology is necessarily a medium. We know from the early Korean discovery of a book printing technology which never became a medium like Gutenberg’s invention.¹⁵

Every medium has its basic technology as its material substratum but cannot be reduced on it. To affirm the fundamental difference we distinguish between mate-

¹¹ Mark Weiser, The Computer for the 21st Century. In: Scientific America, 1991. 265 (3), pp. 94-194.

¹² Streitz 2007. Streitz is the most important scientist of the Fraunhofer IPSI. See for a selection of his publications: http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/s/Streitz: Norbert_A=.html

¹³ This early vision of Weiser’s has by now been accepted by the EU-funded initiative „The Disappearing Computer“ (DC) of the „Future and Emerging Technologies“ society (FET) within the EU research program „Information Society Technologies“ (IST) and has since been worked out by numerous projects concerning „Smart Artefacts“ and „Smart Environments“, to be supported in Germany above all by Fraunhofer’s IPSI and SIT. To assess the social importance of these projects see the comments of the IST Project on their own website: „The Smart-IST project is interested in a far reaching vision of computation embedded in the world. In this vision, mundane everyday artefacts become augmented as soft media, able to enter into dynamic digital relationships. In this project we approach this vision with development of “Smart-ITS” – small scale embedded devices that can be attached to everyday objects to augment them with sensing, perception, computation, and communication. We think of these “Smart-ITS” as enabling technology for building and testing ubiquitous computing scenarios, and we will use them to study emerging functionality and collective context-awareness of information artefacts.” For more information see Rückriem 2009a, b.

¹⁴ Streitz 2005a, 2005b, 2006, 2008a, 2008b.

¹⁵ See Giesecke 1991a, 1994.

rial and epistemic quality, that is, between object and medium or in philosophical terms: between its ontological and epistemological understanding.¹⁶ So we may refer on the same thing: dealing with its material quality we refer to (tools or) technology, dealing with its epistemic quality we reflect on it as a medium. These different approaches may not be mingled or mixed up, and the epistemic approach by no means can be interpreted as a negation of the object.¹⁷

Subsequently a medium can never be a cause but a catalyst only. It mediates processes but does not produce them. Media are “Weltbildapparate” (Derrick de Kerckhove) or “Engines of Meaning” (Stowe Boyd).¹⁸ The only producer of social and societal transformations is man himself. The specific function of a medium consists in opening up possibilities and perspectives which had not been possible before.

But as the Korean and Gutenberg examples show a certain technology becomes a socially and societally meaningful general or leading medium only by and through human visions or societal utopia that is through the general acceptance of people.¹⁹

3. What is a revolution?

1. By evaluating the international scientific discourse concerning New Media, we found out that the most commonly used term to characterize the spreading process of New Media is that of “revolution”. Alternative terms in use are “transformation”, “change”, “shift”, and “transition” or combinations of those terms but then resulting in attempts to define the revolution concept by using the other terms mentioned above.

¹⁶ We therefore use the epistemic notion of medium in singular understanding the plural term as naming concrete material devices.

¹⁷ See Engeström’s critic in: Engeström & Sannino 2010, 17.

¹⁸ [http://www.pr-agentur-blog.de/index.php?archives/386-Wo-steht-das-Internet-in-zehn-Jahren-Gastbeitrag-von-Stowe-Boyd.html&serendipity\[karmaVote\]=2&serendipity\[karmald\]=386#karma_vote386](http://www.pr-agentur-blog.de/index.php?archives/386-Wo-steht-das-Internet-in-zehn-Jahren-Gastbeitrag-von-Stowe-Boyd.html&serendipity[karmaVote]=2&serendipity[karmald]=386#karma_vote386). See also Sterling <http://www.wired.com/wired/archive/13.04/view.html?pg=4> [21.01.2011].

¹⁹ See Rückriem 2008, 2009, 2010.

You will get a full agreement and meet with unanimous approval calling the spreading process of New Media a revolution because of the functioning of the term in discussions: “revolution” is seen as a “major or a dramatic change”²⁰, or as “a far-reaching and drastic change”²¹, – that is, it is a synonym for every fundamental change of existing relations, or even more precisely: a synonym for every change seen as radical and drastic that be in nature, society or everyday life – e.g. concerning customs of eating, fashion, moral norms, sexual behaviour and so on.

Apart from very few exceptions the term – as it is used in New Media discourses – is a trite, a meaningless word, for it has no theoretical or practical consequences. So we may say, “revolution” is a container concept²² just functioning as a commonly shared vague idea of what we are talking about discussing New Media and their impact or importance. In other words: It seems to be a hype to join the conversation about revolution, but actually everyone has his or her own private ideas of what this really could be.

2. On the other hand – perhaps you may better say: subsequently – comparing the actual concept of “revolution” in discussions on New Media we encountered big differences and even contradictions in meaning, not only in public opinion, but also in scientific discourses of activity theorists as well.

Here ‘revolution’ is often defined as – please mind the special systemic fields that are considered here –

- „the overthrow or repudiation of a (regime or political) system by the governed” – that is a *political* revolution,
- “the inevitable, violent transition from one system of production in a society to the next” – that is an *economic* revolution,
- a “basic transformation of society’s state” – that is a *societal* revolution,
- a “complete turnover of every existing social relations” – that is a *social* revolution,
- “an outstanding leap of culture” – that is a *cultural* revolution,

²⁰ Encarta World English Dictionary 1999.

²¹ Collins Concise Dictionary, 4(1999), Glasgow, p. 1267.

²² See <http://de.wikipedia.org/wiki/Revolution>, even more detailed in: <http://en.wikipedia.org/wiki/Revolution>.

- a “more or less rapid and fundamental social, economic and/or cultural change”²³ – that is an *overall* revolution – although there is neither a clarification of what “overall” actually means nor a theoretical explanation why a revolution could run off both in all fields, and at the same time everywhere in the world.

We know, of course, that the meaning of “revolution” stems from quite different theoretical frameworks. At least since Hegel, Karl Marx, Alexis de Tocqueville, Arnold Toynbee, Eric Hobsbawm, Charles Tilly (or even Michail Gorbatschow²⁴), there are many different typologies of revolutions in social science, literature, New Media discussion, and public talk. It remains unclear, however, what is exactly meant when calling the process of digitalization a revolution, referring to the theories of ancient philosophers, historians, social scientists or politicians, who were at their time unable to experience the digitalization process or to theorize its impact.

And again, the term remains unclear when we propose to consider digitalization a revolution. We continue our clarification by the following confrontation of “revolution” and “digitalization”.

3. What is most frequently meant with “*revolution*” and what is the *digitalization* process about?

Following methodological criteria²⁵ we may find eight distinctions: “revolution” means

- a spontaneous action, a sudden event, a selective incident or singular occurrence, or a brief transition lasting short time only.
Actually the digitalization process is a lingering, creeping process of long lasting duration or a long term period;
- a subversive topple, a violent conflict or a bloody clash between defined interests of certain social groups or classes.

²³ See e.g. <http://en.wikipedia.org/wiki/Revolution> or Duden (1980): Das große Wörterbuch der deutschen Sprache. Mannheim, Wien, Zürich: Duden-Verlag.

²⁴ Gorbatschow 1988, 7.

²⁵ See Erdmann & Rückriem 2010, 199 ff.

In reality, it is a more or less unnoticed, mostly corresponding, often unanimous change of undefined aims, vague needs and unconscious visions beyond every social status or stratification or clearly identifiable groups or classes;

- a subject driven process including collective agency like e.g. Microsoft, Google or Ebay, and big players like that.

In fact, it is a process without a centre. It is a sort of decentralized and hybrid system, whose mode of operation (in terms of Luhmann) is communication.

- a political process, which can be stopped or promoted by organized political impact.

On the contrary this process affects immensely on politics.

- a process caused by technological devices including web 2.0 social services, which is a kind of media causalism.

But in truth the one and only processor of the revolutionary process is man himself. Media function just like catalysts only and by no means as causes;

- a change of communication in particular as a sectorial or segmental change.

Fact is, that this process compasses every social and cultural system: production, health care, science, universities and learning institutions, entertainment etc. without exception;

- just a change of learning, that is a partial change of a specific psychic function.

On the contrary, we continuously discover the systemic impact of digitalization on every psychic function – on aesthetics, perception, thinking etc.

- is either seen as a deformation, a loss, a decay, a decline of values, or it is seen as an unquestionable leap of progress in the history of mankind, either ways, it is a normative concept.

While revolutions, as we see it, are just making a difference, changing values, producing others, resulting in losses and advantages, closing perspectives and opening up new ones, always depending from the visions of their living participants.

4. In summary, besides the common or even scientific understanding the ongoing changes in terms of revolution being neither systemic nor analytic it does not include a theory to explain what it is or could be that provokes a revolutionary transformation in all these fields (or better, systems) all over the world at the same time. The common understanding is correct for each single field concerned – but it becomes insufficient through its reductive restriction on it. It is right to point to

the inevitableness – but it is wrong to assume causality. It is true to empirically state real losses – but it is wrong to assess them normatively. In our theoretical perspective: it does not provide a theoretical concept for what a medium is or a media revolution and thus unable to recognize the real functional values of even losses, contradictions and discrepancies of both the transformation process and its understanding by the people concerned.²⁶

Using these results, we are now able to define our own understanding of the media transformation process.

4. What is a media revolution?

1. Digitalization is a technology but the basis of a global and universal process. It is generally accepted and socially seen as fundamental prerequisite of personal and social utopia. Thus it became the quality of a medium long since.

2. Digitalization is an irreversible process – a complex systemic change of economic-social, political-institutional and cultural-mental-ideological dimension. Every country, society, national state, every village, region and continent is affected without exception or difference between high developed and developing countries. It is a systemic process: once established no one and nothing – neither personal or social nor cultural systems – is able to get away from its impact. Even a strict rejection of the new medium is only constituted by the new medium itself. One famous and often cited example from media history is Platon: he reasoned the dangerous impact of writing by writing a long paper himself.

3. We consider this process a revolution, but a revolution of its own: it is a *media* revolution, relied on computer networks as the general medium.²⁷ This process won't be understood by the concepts of tool or mediational means, for these concepts have been defined in dependence on book printing as the societally awarded

²⁶ See Giesecke 2002.

²⁷ What qualifies it as a revolution is – quoting Helmut Willke – „die selbstreferentielle Steigerung symbolischer Systeme zu Konglomeraten vernetzter Wirkungsketten. Sie beruhen auf der von John von Neumann beschriebenen Möglichkeit, in digitalen Programmen Daten und Instruktionen autonom zu verknüpfen und daraus im Prinzip beliebig steuerbare Architekturen automatisierter Verknüpfungen zu generieren, die nicht mehr von den Motiven und Interessen einzelner Personen abhängen“ (Willke 2002, 256).

and dominating medium or media constellation of a far gone epoch. The new leading media constellation functions as a qualitatively new level of emerging new overall communication systems opening up to human activity unknown possibilities and perspectives which require new means of scientific design as well.

4. We therefore may call it a systemic „trans-formation“, which is a change of forms in its literal sense: every existing – personal, social and cultural – activity system gets a new form, new functions and new societal meanings through the digitalization process. By this transformation the well known will be radically changed or even destroyed and kept in a new form, and, at the same time, totally new meanings will emerge. This empowers new perspectives and possibilities to every personal, social and cultural system and to every existing form of knowledge – economy, society, politics, science, religion, art, education, as well as aesthetics, perception, feeling, emotions, thinking, our needs and our sense making, and all our psychic functions, and of course the concept of revolution itself as we could see above.

5. Just to remind, and to avoid fall back reactions into unnecessary misunderstandings: media are no causes, they do not make history, the only processor is man himself. The causalistic and deterministic understanding of media is a favoured prejudgement in media discussion. But as we know now, a medium is not a cause. It is a storage of human practice, which give us access to reflection of our living in the sense of Vygotsky and to build up new motives and visions of the future in the sense of Leontiev – new perspectives, that haven't been possible ever before. Again, these are visions of *humans* – and *not* visions of a medium. (By the way, even this deterministic understanding is functional to the transformation process, as we will see later on.)

6. This transformation is not only empowering new perspectives and possibilities of activity. It is also demanding the necessity to reconceptualize the theoretical apparatus of understanding the world by historicizing the hitherto existing ones, including activity theory itself.²⁸

²⁸ As Willke puts it, the new symbolic systems emerging from digital technology separate themselves from real things and grow exuberantly to „Konstellationen von ‚haltloser Komplexität‘ (Luhmann), die in sich und um sich selbst kreisen. Sicherlich erwachen Symbolsysteme erst zum

Our research is therefore aimed to a theoretical and methodological discourse about historicizing the Vygotskian concept of mediation, especially concerning the qualitative difference between tool and language or language and network respectively as historic forms of medium²⁹. We would equally like to discuss the reinterpretation of Lurija's results of his famous Middle Asia Expedition as starting point for a reconceptualization of cultural history as media history or of activity theory as systems theory and coevolution theory.³⁰

After clarifying the theoretical framework and before entering our empirical interest, we have to distinguish between problems and tasks in order to define our special object of investigation.

5. What is and why do we need a transition theory?

1. We are quite urgently in need of a theory of transition because this process of revolution is a long lasting creeping process of unknown length, it is extremely complex and unforeseeably open in its end, and it is interactive, with ourselves as observers involved. There is no way to talk about "revolution" or "transformation" and to forget for any reflection about the real process of what and how is actually changing.

Thus, on the one hand, we need sound theoretical instruments to model the transition process in order to be able to analyze and investigate the process and to operate from an observer's standpoint. Furthermore, since we aim for a reflexive practice towards this process – not to speak of concrete intervention projects in learning or learning institutions – we are in need of a transition theory, for only a theoretical framework allows us to identify specific phases or periods of this long

Leben, wenn sie von Personen aktiviert, in Kommunikationen verwendet und damit in die Operationsweise sozialer Systeme eingebaut werden. Aber sie sind in dieser Potentialität von konkreten Personen und Systemen unabhängig. Niemand schaltet Symbolsysteme an oder ab, niemand beherrscht sie und sie gehören niemandem. Niemand erzeugt oder verändert sie eigenhändig. Und niemand definiert alleine die Regeln ihrer Verwendung. Sie folgen einer Logik, einer Grammatik der Verknüpfung von Elementen, die unabhängig von einzelnen konkreten Personen ihren Anfang und ihren Ausgang in sozialen Praktiken nehmen" (Willke 2002, 252).

²⁹ See Rückriem 2009.

³⁰ See Erdmann & Rückriem 2010.

lasting transition and to hypothesize specific functions according to the given period.

2. On the other hand, such a theory of transition is impossible in itself, since

- we are contemporaries of the transition ourselves, and even more, we are involved in this process and even change it,
- we have actually no option to overlook the process as a whole which is still ongoing for unforeseeable time,
- any prognosis of the future is in danger of remaining a prolongation of the presence because we have no idea of what could be the “end” of the transformation,
- we cannot reliably predict future developments of a revolutionary transformation coming from a point of view in the present because there is no way to deduce historical processes neither at all nor in particular,
- in short: there is no observer’s standpoint to reflect the transition beyond the transition itself.

So, how do we get a sound theory of transition and how can we develop an observer’s standpoint, since we ourselves are right in the middle of the process? This is a problem, and it is unsolvable. How can we deal with it?

3. From systems theory we know the difference between “problems” and “tasks”: Tasks can be solved by designing operative strategies or interventions, but problems are unsolvable. They can only be handled or processed. To deal with problems means risky operations (Ulrich Beck, Helmut Willke). But there is no alternative to this risk because avoidance is as risky as dealing with it. The best way, therefore, is to acknowledge the problem as clearly as possible, and to look for ways of handling it. Our approach is to look for formal models that use analogies to former media revolutions – knowing, that their empirical proof is to come and has to be empirically checked and evaluated constantly.

4. Looking for ways of modelling the transition we run into methodological difficulties.

First: Only literally, but not in reality, term, event and process of a revolution coincide. Revolutions have no „ point zero “. Coming from the traditional revolution theory, we know that revolution and counter-revolution, evolution and revolution,

change and reformation, subversion and conservation necessarily belong together. They only function in an overall context. For that matter, it stands to reason, that processes in a media revolution will proceed in functionally equivalent forms, which have to be grasped analytically and proofed empirically. This characterizes a methodological task which has not been dealt with neither in activity theory nor elsewhere.

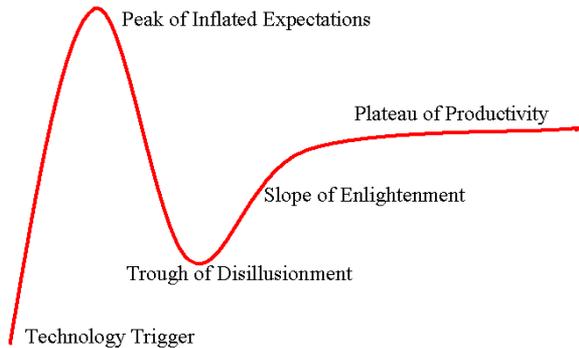
Second: It can be assumed, that the revolution process proceeds faster in some of those areas depicted above than in others. Revolutions mostly run fast in technical and economical systems, but slow in social and political systems. They are even tough and stubborn in cultural systems. Different systems always have their specific time. Thus it could be a reasonable hypothesis to assume that not only the different speed but other different functions could be coordinated to a given period of the transition process. This is another methodological issue which is to be reflected or a task which is to be solved.

5. Surprisingly, only very few scientific discourses are engaged in theorizing transition issues. Besides the traditional biphasic model of Historical Materialism, which has strict normative functions and discerns between „ascending“ and „descending phases“ of revolutions, we have only come across three recent models so far with different grades of quality.

One interesting model is the hype cycle by Gartner Research (see pic. 1).³¹ The model is based on empirical data, describing the process of acceptance of technological innovations in general.

Even though Gartner's curve was clearly not intended to analyse revolutionary transitions and does not claim any theoretical implications, it is nevertheless used for explanation of complex phenomena such as media revolution. This model is operational and at the same time it is strictly formal and doesn't hold any options for analysis of different functions of its five phases that are proposed and clearly distinguished. It also leaves no room to differentiate or identify asynchronisms. Therefore, ideas for concrete intervention strategies can't be taken from this model.

³¹ A well-known US-American consulting and research agency. For the hype cycle see Fenn 2008.



Pic. 1: Gartner Hype Cycle (Fenn 2008)

Peter Kruse, an organisational psychologist and high impact consultant, introduced another interesting but rather anecdotic proposal for modelling the transition. In interviews about the age of the internet,³² he uses the genetic psychological triphase model of childhood, puberty and adulthood to describe the developmental stages of the internet. He concludes that the internet at present has left its childhood and reached puberty, and has just started to develop its real potential of producing societal change. Apart from methodological problems stemming from the fact that it uses psychological concepts in order to analyze media historical issues this model seems to be rather normative than analytic, and therefore of little use for empirical investigation.

The model, which we regard of utmost use, is the triphase model introduced by Michael Giesecke.³³ Comparing the various media transformations in history, he notices that transitions from one media formation to another do not run off arbitrarily, but proceed as a media historical law (McLuhan) in a series of three steps or stages which can be depicted as *dependency*, *counter dependency* and *autonomy*. Although similar models are known from group dynamics or psychoanalytic

³² Kruse, P. & Tholl, G. (2009). Das www ist in der Pubertät [Internet in puberty]. *ZeitOnline*, 05.08.2009. <http://www.zeit.de/newsticker/2009/8/5/iptc-bdt-20090805-427-22007652.xml>. [28.04.2010]. See also Kruse & Kuhn 2009; Kruse & Reinhard 2009.

³³ A media historian, media theoretician, communication scientist.

group therapies, Giesecke considers them useful to explain and depict the transition process of transformations in media history.³⁴ Following Giesecke we may describe three periods of transition, each of them with special functions within the transition process.

Dependency

At the first stage, every new medium adapts all traditional tasks from the older medium aiming to find better solutions for the old problems than the ones offered by former media. Gutenberg e.g. did not intent to start a media revolution, but to simply prettify the copying process of the bible: to make it better, faster, cheaper. Exactly this is the main principle of this first stage. And it is effective to the electrification and digitalization of all those processes of perceiving, counting, presenting and language storing, which are already highly socially standardized. It is true to machines executing logical operations by symbols we know from book culture like letters and numerals. It is also the same for e-books and CD-ROM catalogues, for all those word processing programs and even for all the software applications modeling professionalized and institutionalized actions of traditional social activities.

Therefore, all electronically stored information, which can be changed in typographic products without problems, and vice versa, still belongs to the typographic era. From this point of view, we may say, that we are just starting the transition from dependency to counter dependency that is from the first to the second stage.

We may of course find differences in between this first stage distinguishing three more micro phases. 1. phase: a euphoric overrating and a conservative peniaphobia or fear of losing values, lifestyles or customs; 2. phase: emerging new communication systems and an increasing decay of the existing ones; 3. phase: socialization of the medium and socializing of people and habits.³⁵ Every one of these micro phases within the first stage we may notice clearly during the last 10 or 15 years.

Counter dependency

³⁴ See Giesecke 2002, S. 270 ff.

³⁵ Giesecke *ibid.*

Talking about the *second* stage therefore means to – widely – speculate about the future. But when looking at the main principles of counter dependency: with the focus on the neglected areas, the weak points and shortcomings of the typographic medium and communication systems, we are able to notice interesting new aspects already emerging.

Book culture neglects e.g.:³⁶

- Groups, teams, lateral world systems, world society and world public,
- affect and intuition,
- interactive networks, feedback processes or project organization, above all in terms of societal professionalization,
- chaos and redundancy,
- functional ad hoc decisions,
- control of agreeableness to environment and mankind,
- dichotomies of gender, generations, cultures, classes.

Typographic communication in particular neglects:³⁷

- other senses than vision,
- body experience,
- nonverbal expression,
- affective and circular information processing,
- immediate face to face communication,
- synesthetic cooperation of different senses,
- social self reflection,
- cooperative knowledge production,
- interactive group work,
- self organizing information processing,
- decentralized networking with immediate feedback.

We think Giesecke's points could be taken as methodological criteria to develop empirical studies.

³⁶ Giesecke 2002, 260

³⁷ Giesecke 2002, 261

To summarize this phase, in the ongoing second stage of counter dependency the weak points of the old and the outcomes of the new medium evolve for public discussion. There is a growing interest for alternative solutions of still unanswered problems, and, above all, for interactive, circular and virtual modeling of social processes and man-nature-relations completely beyond linguistic information, visual perception, rational thinking, linguistic storage or form of presentation. Nobody knows the code of the new media yet. Only because of their counter dependency from those still most critical points to us, they will come to perform the third stage.

Autonomy

The *third* stage lies even further ahead in future. We can only say, that autonomy means an extensive liberation from old dependencies affecting the entire personal, social and cultural systems, their totally new and up to now unknown information processing, and their free ad hoc selection of different – old or new, existing or emerging – media. Quoting Giesecke:

“As long as we just replace one technology by another – e.g. heavy industry by information technology – we follow the beaten tracks of modern progress: from coal stove to gas furnace and to voice controlled microwave, from Aeolian harps to flutes, to shellac discs and to CD-ROM, always looking for better solutions for old problems by new technologies. But really new thinking will only commence when we completely stop thinking that our visions could be realized by the pure exchange of technology or the mechanization of individual human achievements. We do not need dream machines any more. Our world is full of them, and we suffer by nightmares when brooding about their disposal.”³⁸

6. Conclusion

Giesecke’s model of transition can be and even has to be operationalized and empirically proofed: It needs to be differentiated concerning periods and psychic, social and cultural systems, and the findings have to be evaluated concerning possible conclusions. We expect this research to be the basis of intervention strate-

³⁸ Giesecke, *ibid.* 297

gies especially in the area of learning, learning institutions and learning cultures. On the one hand, we believe, that such a foundation takes into account the full potential of the present media revolution. On the other hand, we can develop very specific empirical assumptions about why people are more likely to react in so different and even contradictory ways towards the ongoing revolutionary transformation.

References

- Hans-Bredow-Institut (2006): Medien von A bis Z. Wiesbaden: VS-Verlag für Sozialwissenschaften.
- Collins Concise Dictionary (1999): Revolution. Glasgow: HarperCollins.
- Davidson, C. & Goldberg, D.T. (2009): The Future of Learning Institutions in a Digital Age. http://mitpress.mit.edu/books/chapters/Future_of_Learning.pdf [29.04.2010].
- Duden (1980): Das große Wörterbuch der deutschen Sprache. Mannheim, Wien, Zürich: Duden-Verlag.
- Encarta World English Dictionary (1999): Revolution. London: Bloomsbury.
- Erdmann, H-W. & Rückriem, G. (2010): Lernkultur oder Lernkulturen – was ist neu an der 'Kultur des Lernens'? Von einer modernisierungstheoretischen zu einer ,transformationstheoretischen' Sicht. In H. Giest & G. Rückriem, Tätigkeitstheorie und (Wissens-)Gesellschaft. Fragen und Antworten tätigkeitstheoretischer Forschung und Praxis, pp. 15-52. Berlin: Lehmanns Media.
- Engestroem, Y. & Sannino, A. (2010): Studies of expansive learning: Foundations, findings and future challenges. Educational Research Review. doi:10.1016/j.edurev.2009.12.002.
- Fenn, J. (2008): Mastering the hype cycle: How to choose right innovation at the right time. Massachusetts: Harvard Business School Publishing.
- Giesecke, M. (1990): Als die alten Medien neu waren – Medienrevolutionen in der Geschichte [As the old media were new – media revolution in history]. In R. Weingarten (Ed.), Informationen ohne Kommunikation?, pp. 75-98. Frankfurt a.M.: Fischer TB.
- Giesecke, M. (1990): The Media Revolution at the Beginning in the Modern Era and its Historical Significance. Universitas. A Quaterly German Review of the Arts and Sciences, 32(3), pp. 219-227.
- Giesecke, M. (1991a, 1994): Der Buchdruck in der frühen Neuzeit. Eine historische Fallstudie über die Durchsetzung neuer Informations- und Kommunikationstechnologien [Book printing in modern age. A historical case study about the assertion of new information and communication technologies]. Frankfurt a.M.: Suhrkamp.
- Giesecke, M. (1991b): Sinnenwandel, Sprachwandel, Kulturwandel – Studien zur Vorgeschichte der Informationsgesellschaft [Alteration of senses, language, and culture – studies of the prehistory of the information society]. Frankfurt a.M.: Suhrkamp.
- Giesecke, M. (2002): Von den Mythen der Buchkultur zu den Visionen der Informationsgesellschaft. Trendforschungen zur kulturellen Medienökologie. Frankfurt a.M.: Suhrkamp.
- Gorbatschow, M. (1987): Perestroika, die zweite russische Revolution. Eine neue Politik für Europa und die Welt [Perestroika, the second Russian revolution. A new politic for Europe and the world]. München: Droemer Knaur.
- Gorbatschow, M. (1988): Umgestaltung und neues Denken für unser Land und für die ganze Welt [Transformation and a new mindset for our country and for the entire world]. Berlin: Dietz-Verlag.

- Johnson, L.; Levine, A. & Smith, R. (2009): The 2009 Horizon Report [electronic version]. Austin, Texas: The New Media Consortium. <http://www.nmc.org/pdf/2009-Horizon-Report.pdf> [29.04.2010].
- Kruse, P. & Tholl, G. (2009): Das www ist in der Pubertät. ZeitOnline 05.08.2009. <http://www.zeit.de/newsticker/2009/8/5/iptc-bdt-20090805-427-22007652xml> [28.04.2010].
- Kruse, P. & Kuhn, J. (2009): Internetthesen des FAZ-Herausgebers „Schirmmacher ist Zaungast“. sueddeutsche.de 26.11.2009. <http://www.sueddeutsche.de/computer/218/495543/text/> [28.04.2010].
- Kruse, P. & Reinhard, U. (2009): Livestream DNAdigital – Ein Gespräch mit Peter Kruse. In W. Buhse & R. Reinhard (Hrsg.), DNAdigital – Wenn Anzugträger auf Kapuzenpullis treffen (pp. 80-99). Neckarhausen: whois.
- Leont'ev, A.N. (1982): Tätigkeit. Bewusstsein. Persönlichkeit [Activity. Consciousness. Personality]. Köln: Pahl-Rugenstein-Verlag.
- Lorenz, K. (1977): Die Rückseite des Spiegels. München: dtv.
- McLuhan, M. (1995): Die Gutenberg-Galaxis. Das Ende des Buchzeitalters, Bonn u.a: Addison-Wesley.
- Reese-Schäfer, W. (2007): Politisches Denken heute: Zivilgesellschaft, Globalisierung und Menschenrechte. München: Oldenbourg Wissenschaftsverlag.
- Rheingold, H. (2002): Smart mobs. The next social revolution. Cambridge: Perseus books.
- Rückriem, G. (2010a): La tecnología digital y la mediación: un desafío a la teoría de la actividad. Conferencia invitada de la Facultad de Psicología de la Universidad Autónoma de Mejiro (UNAM) y de la Universidad Abierta y Educación a Distancia (CUAED). 28 de septiembre del 2009. In: Sinéctica 34. Revista electronica de Educación. Enero-junio de 2010. http://www.sinectica.iteso.mx/index.php?cur=34&art=34_00.
- Rückriem, G. & Erdmann, J.W. (2010b): Thesen zur Methodologie der Tätigkeitstheorie In H. Giest & G. Rückriem (Eds.), Tätigkeitstheorie und (Wissens-)Gesellschaft. Fragen und Antworten aus tätigkeitstheoretischer Forschung und Praxis, pp. 199-218. Berlin: Lehmanns Media.
- Rückriem, G. (2009a): Digital Technology and Mediation: A Challenge to Activity Theory. In: A. Sannino, H. Daniels & K.D., Gutierrez (Ed.), Learning and Expanding with Activity Theory, pp. S. 88 – 111. Cambridge: Cambridge University Press.
- Rückriem, G. (2009b): Das Problem der Vermittlung. Eine Herausforderung für die Tätigkeitstheorie. Vortrag auf Einladung der Lurija-Gesellschaft. Bremen, 9. 10. 2009. In: Mitteilungen und Materialien der Lurija Gesellschaft, 16 (1), pp. 7-33.
- Rückriem, G. (2008a), Tätigkeitstheorie und Neue Medien oder: A. N. Leont'ev und das Verhältnis von Mensch und Technik. Vorwort zu einigen wenig bekannten Arbeiten Leont'evs. In: Mitteilungen der Luria-Gesellschaft, 15 (1-2), pp. 5-35.
- Rückriem, G. (2008b): Statt einer Einleitung: Internet und Bildung. Bildungstheorie als Medienpädagogik. Vortrag vor der Fakultät für Erziehungs- und Sozialwissenschaften der Universität der Künste, Sommersemester 1999. In: B. Fichtner, Lernen und Lerntätigkeit. Ontogenetische, phylogenetische und epistemologische Studien, pp. XI-XXXVI. Berlin: Lehmanns Media.
- Rückriem, G. (2008c), Työkalu vai medium? Tieto- ja viestintätekniiikan merkitys inhimillisissä käytännöissä. Toiminnan teorian systeemisen ymmärtämisen etsintää (Werkzeug oder Medium? Die Bedeutung der Informations- und Telekommunikationstechnik für die menschliche Praxis. Suche nach einer Schnittstelle zwischen Tätigkeitstheorie und Systemtheorie). Vortrag vor dem 2. Finnish National Congress on Activity Theory and Sociocultural Approach (Überarbeitete Fassung

- des Vortrags.) In: R. Engeström & J. Virkkunen (Eds.), *Kulttuurinen Väilytys Toiminnassa ja oppimisessa (Mediation in Work Activity and Learning)*. Research Reports 11, pp. 29 – 45. Centre for Activity Theory and Developmental Work Research. University of Helsinki.
- Russell, D.M., Streitz, N.A. & Winograd, T. (2005): Building disappearing computers. *Communication of the ACM*, 48(3), pp. 42-48.
- Schirmmacker, F. (2009): Payback. Trailer 1. <http://www.youtube.com/watch?v=WCZuVFNoXxk> [14.04.2010].
- Selwyn, N., Crook, C., Carr, D., Carmichael, P., Noss, R. & Laurillard, D. (2008): Education 2.0? Designing the web for teaching and learning. <http://www.tlrp.org/pub/commentaries.html> [14.04.09].
- Sterling, B. (2005): Order out of the Chaos. *Wired*, 13(4). <http://www.wired.com/wired/archive/13.04/view.html?pg.=4> [21.01.2011].
- Streitz, N.A. (2008a): The Disappearing Computer. In T. Erickson & D. McDonald (Ed.), *HCI Remixed: Reflections on Works that have Influenced the HCI Community*, pp. 55-60. Cambridge: MIT Press.
- Streitz, N.A. (2008b): Designing for People in Ambient Intelligence Environments. In A. Mana & C. Rudolph (Ed.), *Developing Ambient Intelligence*, pp. 47-54. Paris: Springer Verlag.
- Streitz, N.A.; Kameas, A. & Mavrommati, I. (2007a): The Disappearing Computer, *Interaction Design, System Infrastructures and Applications for Smart Environments*. Berlin: Springer LNCS 4500.
- Streitz, N.A.; Prante, T.; Röcker, C. & van Alphen, D. (2007b): Smart Artefacts as Affordances for Awareness in Distributed Teams. In N.A. Streitz, A. Kameas, & I. Mavrommati (Ed.), *The Disappearing Computer*, pp. 3-29. Berlin: Springer LNCS 4500.
- Streitz, N.A. (2006): From Human-Computer Interaction to Human-Environment Interaction: Ambient Intelligence and the Disappearing Computer. In: *Proceedings of the 9th ERCIM Workshop on "User Interfaces For All"*. Königswinter. Wieder abgedr. in: St.M. Pieper (Ed), *Universal Access in Ambient Intelligence Environments*, pp. 3-13. Berlin: Springer LNCS, 4397.
- Streitz, N.A. (2005a): From Human-Computer Interaction to Human-Artefact Interaction: Interaction Design for Smart Environments. In: M. Hemmje, C. Niederee & T. Risse (Ed.), *From Integrated Publication and Information Systems to Virtual Information and Knowledge Environments*, pp. 232-240. Berlin: Springer LNCS, 3379.
- Streitz, N.A. (2005b): Kooperative Gebäude und der "Disappearing Computer". In M. Kerres & R. Keil-Slawik (Ed.), *Hochschulen im digitalen Zeitalter: Innovationspotenziale und Strukturwandel*, pp. 313-332. (Education Quaterly Forum, Bd. 2). Münster: Waxmann-Verlag.
- Streitz, N.A., B. Remmers, M. Pietzcker & R. Grundmann (1999): „Arbeitswelten im Wandel – Fit für die Zukunft?“ – Menschen, Organisationen, Technologien und Architektur an der Schwelle zum 21. Jahrhundert. Stuttgart: Deutsche Verlagsanstalt.
- Vygotskij, L.S. (1992): *Geschichte der höheren psychischen Funktionen*. Münster, Hamburg: Lit-Verlag.
- Weiser, M. (1991): The Computer for the 21st Century. In *Scientific America*, 265 (3), pp. 94-194
- Willke, H. (1998): *Systemisches Wissensmanagement [Systemic knowledge management]*. Stuttgart: Lucius & Lucius.
- Willke, H. (1999): *Systemtheorie II: Interventionstheorie. Grundzüge einer Theorie der Intervention in komplexe Systeme [System theory II: Intervention theory. Basic principles of a theory of intervention in complex system]* (3. ed.). Stuttgart: Lucius & Lucius.
- Willke, H. (2001): *Atopia. Studien zur atopischen Gesellschaft*. Frankfurt/M.: Suhrkamp.

Willke, H. (2002): Dystopia. Studien zur Krisis des Wissens in der modernen Gesellschaft. Frankfurt/M.: Suhrkamp.

Willke, H. (2005): Symbolische Systeme. Weilerstwit: Velbrück.

Willke, H. (2006): Global Governance. Bielefeld: transcript verlag.

Wilson, E. (1998): Inventing the global information future. In: Futures, 30, pp. 23-42.

Wobbe, Th. (2000): Weltgesellschaft. Bielefeld: transcript.

Sachregister

Abhängigkeit
 Autonomie
 Digitalisierung
 Evolution
 Formation
 Gegenabhängigkeit
 Historischer Materialismus
 hype cicle
 intelligente Objekte
 kluge Artefakte
 Kontinuität
 Medienkonstellation
 Medienrevolution
 Medium
 Mittel
 Neue Medien
 aufsteigende/absteigende Phase
 Revolution
 Sinnmaschinen
 System, personales, soziales, kultu-
 relles
 Systemzeit
 Transformation
 Übergang
 Utopie
 Veränderung
 Vermittlungsmittel
 Vision
 Wandel
 Weltbildapparat
 Werkzeug
 Wissen

Keywords

dependence
 autonomy
 digitalization
 evolution
 formation
 counterdependence
 Historical Materialism
 hype cicle
 intelligent objects
 smart artefacts
 continuity
 media constellation
 media revolution
 medium
 means
 New Media
 ascending/descending phase
 revolution
 engine of meaning
 system, personal, social, cultural
 systems time
 transformation
 transition
 utopia
 shift
 mediational means
 vision
 change
 world view apparatus
 tool
 knowledge

Personenregister

Beck, U.
Boyd, St.
Engström, Y.
Erdmann, J.W.
Fenn, J.
Gartner
Geiger, Th.
Giesecke, M.
Giest, H.
Gorbatschow, M.
Gutenberg, J.
Hegel,
Hobsbawm, E.
Kerckhove, D. de
Kruse, P.
Kuhn, J.
Leont'ev, A. N.
Lurija, A., R.
Marx, K.
McLuhan, M.
Neumann, J. von
Platon
Reinhard, U.
Rheingold, H.
Rückriem, G.
Sterling, B.
Streitz, N.
Tholl, G.
Tilly, Ch.
Tocqueville, A.
Toynbee, A.
Vygotskij, L.S.

Weiser, M.

Willke, H.