

From Clovis to Göbekli Tepe: Knowledge Transfer, Specialisation and its Effects on Cultural Memory

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Abstract

The following article analyses the effects of knowledge transfer and specialisation of digital society on cultural memory. Firstly, it questions Assman's hypothesis that cultural memory is 'transcendent' and instead argues for a concept of temporal continuity with regard to the contemporary communicative memory. Secondly, it outlines that the process of decoding the identity-function of cultural memory has become increasingly complex due to specialisation and fragmentation. Thirdly, it gives examples of recent misrepresentations of identity-formation and cultural memory in the petroglyphs of the Clovis first hypothesis and Göbekli Tepe and discusses their respective reconfigurations based on transdisciplinary and digital methods as an illustration of the effects of specialisation and knowledge exchange on cultural memory. Fourthly, it situates the findings within the context of emerging knowledge exchange ecosystems.

Keywords: knowledge transfer, cultural memory, specialization, Göbekli Tepe, fragmentation

Introduction

The significance of and affinity towards cultural memory has lessened over the past decade. On the one hand, the tangible manifestations of cultural memory have been increasingly neglected. Digitization of textual transmissions and preservation of cultural heritage sites suffer from impediments like insufficient funding, coherent strategies and a lack of fundamental infrastructure in the best case, (cf. Kumar and Pandey 2020) or they are subject to deliberate acts of destruction termed 'cultural genocide' in the worst case. (Cf. Kingston 2015) On the other hand, the rich academic debates on the topic in a Western European context have reached a plateau and continuously declined. (Cf. Schwartz 2018) While the focus on Asia has yielded interesting results in its quantitative and comparative methodology, (cf. Dubey 2021) it has primarily called on the established theoretical frameworks. These frameworks,

most notably conducted by Assman, are founded on the presupposition of cultural memory as being transcendent (cf. 1995: 129); however, the effects of specialization within the continuous digital transformation of society suggest a contradictory view: the objectivation of culture is not based on a fixed point but on a procedural continuity. Just as society ascribes meaning to an object, so is the object itself subject to reconfigurations and therefore an interpretation of an event, which needs to be decoded in the context of temporal continuity. This process is a scholarly negotiation between society, history and culture, and can only foster in an ecosystem of knowledge exchange.

This paper will thus propose that cultural memory is not based on a fixed point but rather a continuous process that is accelerated by the increasing specialization of society. Firstly, we will approach the notion of contemporary society and cultural memory from a cultural, philosophical and medical point of view, questioning Assman's hypothesis of cultural transcendence in favor of continuity. Secondly, we will assess two significant instances of objectivized cultural artifacts in the Clovis first hypothesis and Göbekli Tepe that fairly recently underwent a reconfiguration to validate the theory of temporal continuity in cultural memory. Thirdly, we will address the institutionalization of knowledge transfer ecosystems and their effect on the formation, stabilization and interpretation of the identity-function of cultural memory.

Cultural Memory and Digital Society: From Transcendent to Manifest

When Assman first coined the term *cultural memory* in his seminal essay "Collective Memory and Cultural Identity", he placed it within the sociological concept of identity-creation through collective or social memory as developed by Halbwachs and Warburg. (Cf. 125f.) The collective memory consists of a communicative and a cultural memory. The former is based on everyday communication and constitutes a socially mediated memory in relation to a group which is defined by its common image of the past. As such, the communicative memory is transmitted primarily orally and limited by a temporal horizon of a hundred years. Only when memory is removed from its temporality by a deliberate act of objectivization does it transcend the everyday and is placed in the cultural realm. Cultural memory, according to Assman, therefore has a fixed point in time, which is commemorated through any form of cultural formation or institutionalized recital. (Cf. 129) This commemoration, then, allows for a reconstruction of the group's identity through a sense of unity and specificity.

While the effect of cultural memory on identity is certainly significant, the theory posed by Assman does not include the actual formation process of either communicative memory as the basis for cultural memory or objectivization and its subsequent implications. In pre-industrial cultures, oral – and to a very limited degree written – transmission of the past was limited to the expertise of few individuals based on birth right, education, or hierarchy. (Cf. Martindale et al. 2018: 199) Their interpretation of the past established the framework, in which communicative

memory could develop. The communicative memory was thus faced with two inherent issues: bias in interpretation and a lack of opportunity in participation. The formalization and formation process of objectivization necessarily required the interpretation of the past within the communicative framework and perpetuated the issues of bias and participation either willingly or unwittingly. Cultural memory as the manifestation of objectivization is therefore twice removed from the past proper. Its cultural formation, as Assman rightly notes, has the properties of “reflexivity” (1995: 132), but relies on secondary or auxiliary modes of reference: rituals are accompanied by oral transmissions of past interpretations, monuments adorned by epigraphy, texts annotated. The formation of cultural memory does not exist devoid of communicative memory nor is it removed from its temporal origin. While cultural memory denotes a fixed point in time, its meaning-creation and interpretation rely on communicative memory to form a procedural continuity. In order to interpret cultural memory, then, the fixed point in time can only serve as a reference that needs to be filled through the auxiliary nodes of communicative memory to explain the identity-function with regard to both the cultural objectivization of the past and the contemporary communicative past.

The complexity of decoding cultural memory correlates strongly with an increase in specialization. Pre-industrial societies used memory experts for the oral transmission of the past. With the Industrialization and the subsequent compartmentalization of complex processes, however, (cf. Jones 1977) the need for general education like literacy and a higher degree in specialization accelerated. Specialization promotes a high level of functionality in only one certain area, as even Adam Smith noted (cf. 2008: V.I.III.II), which negative effects with regard to general knowledge were counteracted by the simultaneous requirement for education to stimulate the skills of the workforce. Both mean knowledge and specialization therefore gradually rose in relation to each other. The greater the technological progress over time, the higher became the degree of specialization. With the increasing specialization, the demand for education also climbed. While specialization is advancing even today, the curve of general knowledge reversely reached its maximum around 1990. (Cf. Flynn 1984) Thereafter, it declined drastically in correlation with the rise of new digital technologies. (Cf. Dutton et al. 2016)

The effect of specialization on the interpretation and formation of cultural memory is twofold. Firstly, the unprecedented specialization of contemporary society has led to a fragmentation. (Cf. Foucault 1995; Jameson 1992; Lyotard 1992) On the one hand, this fragmentation is visible in the alienation from work processes, which resulted in the loss of a significant marker of identity-creation. In contrast to prior societies, the communicative memory cannot function as a stabilizing force with regard to identity. Digital technologies have pried the monopoly of oral transmission and reduced the underlying bias of participation. Therefore, the objectivization of memory is also less pronounced today with monuments, for example, seldom commemorating contemporary events. On the other hand, the fragmentation is also evident in

research. The interpretation of texts as cultural memory, for instance, is overwhelmingly one dimensional. The context is outlined by historians, language-use classified by linguists, the literary quality by academics of literature. Rarely is there an initiative to holistically approach texts to analyze their function as cultural memory. This, however, is necessary to interpret their agency in identity-creation and can only succeed in knowledge exchange economies including transdisciplinary co-creation of research and the governmentally approved integration of the public with regard to local or national peculiarities of the given area of research. The significance of collaboration, transfer, public engagement and societal impact of research is currently also structurally promoted and financially incentivized. (Cf. Guimón and Paunov 2019) The ensuing effects of this promotion can best be observed in one of Hamburg University's Clusters of Excellence: Understanding Written Artifacts. Funded by the DFG, the cluster combines practices from the Humanities and the natural sciences to conduct global research into the different dimensions of written artifacts ranging from material studies to content and format. Thereby, it deepens cross-disciplinary collaboration and integrates local expertise in preservation, research and archiving, for instance in the Palm-Leaf Manuscript Profiling Initiative.

Secondly, medical studies suggest a correlation between communicative memory and specialization. In layman's terms, the creation of (communicative) memory is outlined as neurons sending electrochemical signals (neurotransmitters) through synapses during an event, which cause a ripple effect in the surrounding areas. The more neurons are at work at any given time, the stronger the formation of instances of memory. (Cf. Austin 2003) Bilalic et al. describe a strong correlation between specialization and memory: The more specialized the knowledge, the higher the ability to create and recall memories in the area of expertise. (Cf. 2009) Reversely, specialization negatively affects the creation of memories outside the area of expertise. This correlation supports the analysis of fragmentation of research due to specialization. Furthermore, Amin et al. as well as Bruhan and Moradzadeh illustrate the role of digital technologies and communicative memory (cf. 2017; 2020): while smartphone usage allows for participation, it activates dopamine transmission, which determines the ability to create and recall memories, in a "feedback loop". Positive and negative emotions alike trigger an addiction-like usage of smartphones, which repetitively activates the release of dopamine and thus reduces the overall capability of memory-creation.

In summary, communicative memory is the basis of cultural memory. Its function as an identity-marker cannot be derived devoid of the communicative memory. Therefore, cultural memory does not transcend time. It can only be decoded by taking into account the past auxiliary communicative memory as well as contemporary communicative memory. This process of decoding has become increasingly complex with the advent of specialization. In the digital society, communicative memory is no longer formed by memory experts. Technological means and access have allowed for individual interpretation of the past as well as instantaneous participation. While this

specialization reduces bias, medical studies suggest that the underlying technological progress simultaneously negatively affects the overall ability of memory-creation and therefore also aggravates the formation of cultural memory. Combined with the fragmentation of the self in contemporary society, which is caused by the increase in specialization, both communicative and cultural memory seem to be in a decline. This also affects research, which focuses mainly on a one-dimensional study of phenomena. To counteract the effects of specialization on memory and research on cultural memory within the discourse of digitalized society, the recently established knowledge exchange ecosystems offer a platform of negotiation and collaboration between academic research, public engagement and governmental interests. Before we enter into the discussion of knowledge exchange ecosystems with regard to cultural memory, however, we seek to validate our hypothesis of temporal continuity by analyzing and discussing two significant instances of a reconfiguration of objectivized cultural artifacts, which will then offer valuable practical insights into the workings of knowledge transfer: petroglyphs and their identity-function within the Clovis first hypothesis as well as Göbekli Tepe as an interpretation of religious identity.

Cultural Memory: Distorted and Reconfigured

Methodology

We chose these archaeological discussions because they are well known to a broader public. They have only recently undergone a questioning of the accepted paradigm due to transfer activities with widespread implications and therefore serve well as an example. We first of all analyzed the respective hypotheses about the identity-function of cultural memory through a broad interdisciplinary academic review of relevant literature. Then, we outlined the academic change in perception due to new methodologies and combined the different interdisciplinary findings to form a theory on identity-function of cultural memory in the context of the continuity of cultural memory. Lastly, we placed the findings into the framework of innovation ecosystems and explain their function with regard to academia in the process of formation, stabilization and interpretation of interdisciplinary theories.

Clovis first Hypothesis

From the second half of the 20th century to well into the 2000s, archaeologists upheld the Clovis-first hypothesis, according to which humans crossed the Beringia land bridge and first settled in the Northern Americas around 13.000 years ago. (Cf. Waters and Stafford 2007) The culture was named after mostly projectile point artifacts found at an archaeological site near the town of Clovis, New Mexico and has been adapted to numerous later excavations throughout North and South America. Within these excavation sites, archaeologists have also found objectivized cultural artifacts, most notably cave paintings (cf. Aschero 2000) and petroglyphs (cf. Whitley 2013). Since the archaeological paradigm of Clovis first remained largely unchallenged in the

archaeological community until the 2000s despite conclusive evidence of prior human civilization in the North Americas in as early as the late 1970s and early 1980s (cf. Cinq-Mars and Morlan 1982), the cultural memory embedded into the objectivized artifacts has been and is still linked to an identity-function of the Clovis culture in the context of the surrounding point artifacts. (Cf. Aschero 2000; Morrow 2019) Common interpretations suggest them to be gathering sites of few monolithic cultures commemorating successes in hunting. This interpretation, however, neglects the diversity of the artifacts and can be attributed to analytical overemphasis on Clovis. (Cf. Dillehay 2009)

More recent studies using transdisciplinary chronometric methods of research like carbon-14 dating (cf. Whitley and Dorn 2010) and varnish microlamination dating (cf. Liu and Broecker 2008) have concluded that many petroglyphs predate Clovis culture and by the Clovis period display a high degree of stratification in geographical location and stylistic, technical and iconographic variation. Whitley's theory (cf. 2013) that the differentiation of Clovis culture due to the geographical distribution and variation of the petroglyphs is most likely to have happened prior to the arrival in the North Americas is not necessarily convincing. There is a clear correlation between differing geographical locations and cultural variation, which could have therefore also developed during the unquestioned colonization of the Americas by the Clovis people. The more conclusive interpretation is based on the pre-Clovis petroglyphs. The depiction of animals and geometrical forms is clearly linked to or replicated in Clovis-period petroglyphs despite a 2000-year gap in transmission and geographical distribution. Whether or not the pre-Clovis people were an independent people that encountered or mixed with or even became extinct before the arrival of the Clovis people is still unknown. What can be inferred from the petroglyphs despite the abovementioned possibilities, however, is that the Clovis people gathered in the same locations, continued the practice of petroglyphs and even used similar forms of depiction. The objectivized cultural memory is therefore not simply an identity-function of historiographical success in hunting, but a process of identity-formation with regard to the temporal continuity of a pre-Clovis inheritance, the quasi-religious and ritualistic celebration of life by the grace of the natural environment and the preservation of the self by the oftentimes accompanying depiction of hands.

The misrepresentation of the objectivized cultural memory with regard to its identity-function can largely be attributed to the conscious or unconscious application of the original hypothesis of cultural memory by Assman. According to it, the petroglyphs as a deliberate act of objectivization depict a singular event that creates a form of unity and specificity to the cultural group of people. Researchers have even taken into account the surrounding point artifacts, which can be considered to act as a form of what we have called auxiliary communicative memory that was supposed to not have endured the test of time. The error of interpretation, then, is situated in the contemporary communicative memory and can be analyzed according to three major points: fragmentation and digital specialization.

On the one hand and by the second half of the 20th century, the fragmentation of the self and therefore of areas of expertise had been fully developed. Studies of the postmodern condition analyzed the effects on society, and research peaked in its one-dimensionality. As evident in the archaeological paradigm of Clovis first, scholars neglected to take into account alternating evidence or suggestions from other fields of research. This directly led to a false assumption to conceptualize the prehistorical era of the Americas in terms of few monolithic cultures, to which all artifacts were then attributed by default. Without the mediating factor of digital availability and instantaneous participation, the communicative memory was still closely managed by memory experts like researchers in the given area of expertise. On the other hand, and by the 2000s, the digital specialization and its effects on the communicative memory became prevalent. Digital means allowed for a higher degree in availability of transdisciplinary methods, more participation and therefore the dissemination of communicative memory. Since the paradigm of Clovis first had been established before the general advent of digitality, the academic turnaround of nearly seventy years of scientific consensus (cf. Braje et al. 2017) based on new data, methodologies and hypotheses has been and is still taking place.

Göbekli Tepe

Another important archaeological site that had been misrepresented and successively reconfigured with regard to its identity-function in cultural memory is Göbekli Tepe. In 1994, German archaeologist Schmidt located the site according to prior descriptions by American researchers. (Cf. 2001) He soon classified the unearthed megalithic structures, which were radiocarbon dated to 11.500 years ago, as the world's first temple or sanctuary built by a group hunters and gatherers due to four main indications (cf. Clare 2020): one, skillfully carved T-shaped pillars that indicated special buildings; two, no domestic structures; three, no supply of water; four, knowledge about lack of agriculture and domestication of livestock to supply the work force up until the first establishment of agricultural economies at around 10.800 years ago (cf. Akkermans 2004). In this – even today – highly accepted interpretation, the sanctuary of Göbekli Tepe was created to establish a group identity of different sociological organizations of hunters and gatherers that convened during prosperous times of game to commemorate the dead and slowly form their tribal identity, which in turn contributed greatly to later civilization efforts. (Cf. Schmidt 2009)

More recent studies, based on later excavations in combination with transdisciplinary and zooarchaeological methods like Phytolith analyses (cf. Dietrich et al. 2019), show a different sociological formation and archaeological distribution. Rainwater drainages were found around adjacent buildings, and the structure of subsidiary rectangular buildings with the use-and-wear analyses of artifacts in them corroborated the Phytolith analysis of earth material that cereal production of grain was part of Göbekli Tepe. In combination with the highly skillful and difficult high relief art of the T-shaped pillars, (cf. Kinzel and Clare 2020) an important observation

can be made: the sociological formation of human organizations other than hunter-gatherers depended on the surplus of agriculture to build monumental and decorated sites. In Göbekli Tepe, the given evidence suggests that agriculture and therefore civilization processes had already become part of human structure by 9.500 BC. Therefore, the proposed identity-creation of the sanctuary per definition cannot function as cultural memory in its proposed value of temporal transcendence based on a fixed point in time but rather seems to be the result of a much older evolutionary process. The developed high relief art and agricultural remains especially seem to suggest that this formation dates back more distantly than currently defined by accepted interpretations of the prehistoric era.

The misrepresented temple narrative of Göbekli Tepe as cultural memory in the form of tribal identity-function of a group of hunter gatherers proposed by Schmidt is, as the current lead excavator of the German Archaeological Institute, Dr. Lee Clare, notes, a “paradigm [that] will doubtlessly prove difficult to dispel [...]. New insights [...] have exposed the weaknesses of the temple-narrative, meaning that a revision of the popular scientific view is now unavoidable.” (2020: 4) Similarly to the Clovis first hypothesis, the initial and leading interpretation of the monument attributed the characteristics of Assman’s theory of cultural memory formation to the site: Göbekli Tepe is transcendent rather than to be interpreted as a temporal continuity and denotes a singular event of identity-formation rather than an evolutionary process. Even though auxiliary communicative memory in the form of artifacts had already been discovered, its impact on the temple narrative as cultural memory was disregarded. The misrepresentation therefore can be explained by two factors: one, the unavailability or neglect of the study of the auxiliary communicative memory; two, the fragmentation and lack of digital specialization of the contemporary communicative memory.

On the one hand, the lack of prioritizing the auxiliary communicative memory correlates with the explanation of fragmentation of the contemporary communicative memory. The one-dimensional approach to an interpretation of cultural memory can be explained by the fragmentation of research and the concurring existence of memory experts due to a persisting lack of participation. On the other hand, by the late 1990s, digital specialization had not yet evolved completely. Digital participation was not feasible satisfactorily and the methodology was still lacking. By 2020, both transdisciplinary participation and better technological solutions to existing methods changed the representational basis of the cultural memory and identity-formation in Göbekli Tepe.

Discussion: Ecosystems of Change

In both the case of the Clovis first hypothesis and Göbekli Tepe, leading scholars first applied the characteristics of what Assman proposed as cultural memory to the respective cultural artifacts. The interpretation of their identity-function was based on the notion of transcendence and a lack of reflexivity on the contemporary

communicative memory. The hierarchical structure of academic knowledge transmission up to the 2000s allowed for the formation of a scientifically accepted narrative or paradigm. Since the establishment of the digital knowledge society and the subsequent admission of digital technologies into the academic discourse, this view has – to a limited but significant degree – changed. In this research, we have deliberately picked two important archaeological examples that underwent a reconfiguration to illustrate the relevance of knowledge transfer to academic studies in general, on the one hand, and to discuss its significance in the entire spectrum of academia, on the other hand.

The modern framework of knowledge transfer itself originated from the unilateral concept of university-industry partnerships, in which fundamental research served as part of the foundation for economic innovation within the ongoing change from a resource to a knowledge-based economy. Due to digitalization and global interconnectivity, this model gradually evolved towards an integrative ecosystem of innovation: a triple-helix model connecting industry, university and government. (Cf. Etzkowitz and Leydesdorff 1995) Global businesses needed external innovation for growth, universities provided new and experimental options and governments attempted to regulate and steer innovative systems according to their respective needs. (Cf. Ferreira and Carayannis 2019) This extension of economic logic into uncommodified domains has led to an initiative of universities to profit from innovative research. (Cf. Laruffa 2022) Combined with the more pronounced ability of digital participation of society, the theoretical model has expanded into the quadruple helix, incorporating societies' demands on innovation. (Cf. Galvao et al. 2019) While this framework generally emphasizes economic needs and (social) innovation, its subsidiary correlating effects on internal knowledge transfer are irrefutable. With the external stimulus of revenue, funding and acknowledgement, university policies internally began to advocate in favor of innovation and knowledge transfer in research also. Furthermore, just as digital means accelerated globalization in industry, they allowed for more international and transdisciplinary academic knowledge exchange. These impact-oriented strategic changes affected first and foremost those academic fields with inherent ties to industrial innovation: the STEM fields, economic studies and medicine, but also negatively affected the Humanities by redistributing resources to more innovative disciplines.

The given examples in the field of archaeology are situated between the sciences and the Humanities and offer valuable insights into the differing self-conceptions, methodological workings, relations to the current knowledge societies as well as their adaptability to innovation ecosystems. On the one hand, the sciences by and large identify themselves as a data- and evidence-based field of study. Their methodical, transparent, and reproducible approach to a given hypothesis works well within an ecosystem of knowledge transfer, in which innovations between industrial needs, academic research and governmental regulations can foster.

On the other hand, the Humanities have been defined as a mostly one-dimensional, theoretical area of research. (Cf. Straumsheim 2014) In the interpretation of the identity-function of cultural memory in the petroglyphs of the Clovis first hypothesis and Göbekli Tepe, surrounding evidence was not taken into account. The first academically accepted and to this day defended theories are therefore based on partial evidence and speculation. Scholars have created a paradigm that, even though recent proof suggest it to be erroneous, cannot easily be dispelled within the scientific community; however, and despite this, archaeologists have also displayed a profound ability at adaptation to digital and transdisciplinary methodology. Given the inherent nature of archaeology as a transdisciplinary field, this should not come as a surprise, but it is reflective of a general trend in the Humanities. Both external stimuli like funding and the strategic positioning of universities towards more knowledge exchange and internal stratification with the creation of digital subdisciplines attempt to redefine the primacy of theory. (Cf. Poschinger 2023) Transdisciplinary methodology that strengthens the notion of knowledge exchange especially is both financially incentivized by research funding institutions and oftentimes a prerequisite for it. In the given examples, corroborating chemical analyses suggested the need for a redefinition of the framework of contemporary communicative memory in order to understand and more accurately define the identity-formation of the respective cultural memory. Established internal knowledge exchange ecosystems thus helped the formation of cultural memory.

Next to the formation of cultural memory, these ecosystems of innovation also bolster the stabilization of it. Existing scientific or academic paradigms can hardly be dismissed. The notion that spinach contains a large quantity of iron still circulates today despite a significant decimal point error as does the falsely proposed correlation between certain vaccinations and autism. (Cf. Rekdal 2014) Both studies had first been accepted due to the hierarchical structure of knowledge transmission in academia before the results were eventually questioned and finally dismissed at a much later date. Knowledge exchange ecosystems with digital participation of academia, industry and the public necessarily include the qualities of transparency and reproducibility, as studies can be assessed nearly instantaneously by experts in the field and the interested public alike. The hierarchical structure of knowledge transmission has therefore flattened to a certain degree and the generation of universal and accepted paradigms has lessened. In the examples given, the Clovis first hypothesis could have been challenged much earlier if digital participation of other renowned scholars and the public had been possible in the late 1970s. By the mid-2000s, digital availability and participation had allowed for a widespread circulation of evidence contrary to the accepted paradigm. Even though the narrative is not entirely dispelled yet due to the longevity of the initial claim, the scientific turnaround illustrates the strength of knowledge exchange ecosystems. Its function as the contemporary communicative memory accounts for the integration of

transdisciplinary methods to stabilize the new formation of identity in cultural memory.

Lastly, these ecosystems also act as the primary agent in the co-creation of cultural memory interpretation. With the postmodern fragmentation of the self and the concurring one-dimensional approach to research, transdisciplinary methods and co-creational participation in studies were more uncommon albeit relevant and necessary to academia and science. In contemporary knowledge economy by contrast, transdisciplinary chemical methodology by zooarchaeologists have confirmed more detailed excavations in that the temple narrative of Göbekli Tepe is less likely than a reconfiguration of history towards a more distant civilization than previously presumed. Thus, the identity-function with regard to the central buildings believed to be a temple manifested as cultural memory needs to be discussed in light of previous civilizations that cannot be easily classified as hunters and gatherers.

While the theories about knowledge exchange ecosystems as well as their practical appearance in academia have existed for nearly thirty years now, the adaptations of their inherent characteristics have evolved more slowly and diversely. The STEM-fields with their close connection to industrial innovation and more transparent and methodical methodology have applied the transdisciplinary and digital needs of research quicker than the Humanities; however, facing external stimuli and internal pressure, the Humanities have opened up their primacy of theory in favor of a more inclusive approach to research. While the interpretation of the identity-creation of cultural memory in archaeology is situated between the sciences and Humanities, it illustrates this change quite convincingly. The theoretical paradigm of identity-formation of two examples of cultural memory in the Clovis first hypothesis and Göbekli Tepe was challenged by means of transdisciplinary, scientific and digital methods until the accepted narrative had finally been overturned. Similarly, the Humanities in their entirety are currently faced with the Digital Humanities, which attempt to integrate the theoretical framework of the Humanities into digital, innovative and impact-oriented practical solutions that engage with the public. As such, the Digital Humanities as a whole and the several subdisciplines adhere to the transdisciplinary approach to research within the new knowledge economy without abolishing its theoretical foundation. If the Humanities follow this path, new and innovative ideas based on the theoretical groundwork may help rejuvenate a field which very existence has been put to question. As in the case of cultural memory as proposed by Assman, the theoretical framework offers invaluable insights by distinct scholars, which help to form an understanding of overarching cultural and sociological motifs, but may also be reinterpreted by relying on digital and transdisciplinary means.

Conclusion

Innovation ecosystems are most prevalent in their hinge function between academia and industry in the STEM fields. While this serves a valuable goal by releasing

research from its academic restraints, it simultaneously narrows the very concept of knowledge exchange to industry-relations and outsourcing with regard to both the external perspective on research and the internal self-definition of universities. As the given examples have illustrated, however, knowledge exchange through co-creation and interdisciplinarity can produce significant results. In both cases, new digital methodologies combined the expertise of scientific disciplines with information technology to challenge the dominant academic narratives in favor of data-based evidence. In the Humanities especially, these interdisciplinary approaches to research should be implemented to a higher degree. Despite their inherent skepticism towards digitality and the commodification of academia, many disciplines attempt to integrate digital or co-creative methods or reflect on the changes in society through technology and thus advertise for systematic changes of the analogous control mechanisms of the Humanities. Without leaving their theoretical foundations, Humanities' research needs to make use of these options to generate relevant and marketable products or studies and re-think themselves within the digital age.

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