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Understand Simondon's Individualization of Technical Objects and Their Application in Education from a Digital Perspective

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Abstract

In today's society, our way of life is changing at an increasingly fast pace. For a long time before, people communicated by letters and phone calls. Now with the development of digitization, smartphones began to appear and quickly swept the market, with various social media and instant messaging. Communication Software. There are indications that our world is becoming more and more digital, and that the maturation of the Internet and computer technology has brought more complex and unpredictable effects on people than the changes brought about by mechanical technological advances before. This influence is not only on our life experience but also on cultural development. This article analyzes Simondon's elaboration in his book "On the Mode of Existence of Technical Objects," according to Simondon's interpretation of technological objects, taking the relational database as an example, to digital technological objects, as well as human beings in a digital environment, conduct research about technical objects included in computer science.

Keywords

Digitization, Individualization of Technical Objects, Relational database, Educational Application, Gilbert Simondon

1. Introduction

We live in the twenty-first century with the explosion of computer science and Internet technology. It would have an impact not only on our daily lives but also on our culture. Simondon's theory of technical object individualization has a robust and inspiring effect on our understanding of the current technological status quo and social reality. In the introduction of on the mode of existence of technical objects, Simondon (2017, 15) writes that because culture assumes that technical objects do not contain any human reality, it is constructed as a system of opposition to technics. He argues that the opposition between culture and technics, as well as the opposition between man and machine, are not only false but have no foundations; the opposition only perpetuates ignorance and resentment. Simondon sees the opposition between technology and culture and the indifference and incomprehension of technics in the 20th century. In order to have a more conscious understanding of the meaning of technical objects, he considers individualization as an evolutionary way of peering into technical objects and their relation to the human world (Hui, 2016, p. 14).

2. Discussion on related concepts

2.1 The concept of technical objects

Simondon sees the evolution of technical objects as the evolution from abstract to concrete. It means that a technological object is an object constantly concretizing, and the evolution of a technical object is actually a process of concre-

tization, which entails the thing's convergence and adaptation to itself (Hui, 2016, p. 55). By reading Simondon's introduction to various industrial technologies and machines, we can learn that if a technical object integrates more functions into itself, then it has completed its evolution compared to before, becoming more concrete than it was previously. One aspect of concretization is the increase in the functionality of the structure. These functions, however, must not be irrelevant. For instance, if a vehicle manufacturer adds some personalized decoration to a car's appearance or modifies the car's chassis based on a customer's request, the changes made in such aspects that are unrelated to the nature of the vehicle technology itself are negative and even contradictory to the essence of the technological existence. Accessories that do not contribute to performance improvement carried by the car or the technical object are as heavy a burden to the technical object as custom-made goods in handicrafts (Simondon, 2017, p. 30). Thus we know that what Simondon considers technological objects are not artisanal customized handicrafts but industrial productions. Another aspect of concretization is the refinement of structures and the better control of them, such as the development of the diode to the tetrode. "Concretization gives the technical object an intermediate place between the natural object and scientific representation." (Simondon, 2017, p. 49) In other words, the concrete technical object is closer to the way the natural object exists, tends to be intrinsically consistent, and is a part of a causal system.

2.2 The concept of individualization of technical objects

Regarding the individualization of technical objects, Simondon proposed three concepts: technical element, technical individual, and technical ensemble. A technical element is a simple building block that is completely detached from its environment and can be used in any setting. On the other hand, the technical individual requires two kinds of milieu: a technical milieu, and a natural milieu, also called the geographical milieu. There are two essential characteristics of a technical individual. The first one is recurrent causality. The other is that technical individuals will merge technical and geographical environments together to form an associated milieu. The Guimbal turbine is an exciting and practical example: the water flow pushes the turbine and carries away the heat simultaneously. The water flow is the geographic environment of the turbine, while it is combined with the turbine's technological environment into an associative milieu; the faster the water flows, the faster the machine, demonstrating the recurrent causality involved (Simondon, 2017, p. 57). Simondon defines the associated milieu as a necessary condition for technical individuals, and as a means of adaptation to ensure that technical individuals are not affected by the natural environment and external technologies. It provides the stabilizing ability to restore the balance of the system. Technical individualization depends on the discovery of the associated milieu. The technical ensemble, which contains different technical elements and technical individuals, has to avoid a single associated milieu. One of the sub-ensembles with recurrent causality in an associated milieu is the principle of individualization of technical objects in an ensemble; all technical objects with recurrent causality inside their associated milieu must be separated from one another and connected in such a way that these associated milieus remain independent of one another (Simondon, 2017, p. 65). As we can see, the discussion of the individualization of technical objects above is based on Simondon's interpretation regarding the dominant hardware technologies or industrial machines of his time, without addressing digital technologies that significantly impact us today. The future research direction is to try to understand the individualization of digital objects from the perspective of the relational database, a digital tool, combined with the above two crucial characteristics of technical individuals.

2.3 The concept of relational databases

The concept of relational databases was introduced by E. F. Codd in 1970. A relational database is a digital database based on the relational model of data. The relational model used for database management is an approach to managing data using a structure and language consistent with first-order predicate logic (Codd, 1970). The purpose of the relational model is to provide a declarative approach to specifying and querying data: users directly declare what information the database contains and what they want from it, and leave it to the database management system software to describe the data structure used to store the data. E. F. Codd represents all the data of the relational model in tuples (Tian Zhengzheng, 2021) grouped into relations, and uses the tuple relational calculus as the basis of the database (Codd, 1969). The relational model treats data as a two-dimensional table where any data can be uniquely identified by a row number plus a column number. Such a table can specify the attributes and relationships of the data stored in it, and the relationships can be generated by comparing multiple two-dimensional tables. We can understand the relational model based on our everyday experiences. For example, create a table to store the personal information of all students in a class, including name, gender, student number, email address, cell phone number, and so on. Then create another table to store students' grades in this class for an exam, and this table contains the information of name, student number, and grades. The student number is the information that connects these two tables. Finally, we can use SQL (Structured Query Language) statements to query and modify this information stored in the relational model in a relational database.

So that according to one email address, we can get the student's test score by looking up the student's number in another table.

As a milestone in popularizing relational technologies and computer operations with big data, relational databases have further developed to increase the digitization of society, showing us that the relationship between one set of data and another can be obtained and enhanced by logical reasoning. The data that exist in a relational model, or the digital objects represented by the relational model itself, is a set of logical statements that are subsumed in a calculation (Hui, 2016, p. 26). Personal computers and the Internet have spread from professional computer scientists to every ordinary user over the last few decades, while we as users have witnessed the development and concretization of digital technology. In today's highly digital age, people are surrounded by binary information that computers can easily process. In the case of databases, for example, (Yu Yang, 2018) when we use a computer or search the Internet to find out where a specific book is located on a library shelf, what appealing restaurants are available on take-out apps, information about flights to Shanghai in May, the stock of milk that can be purchased online at a specific supermarket, our medical records, or whatever we randomly search for on Google, we almost always retrieve data information in relational databases. The concretization of digital objects brings about a technical system of formed relations in which anything has the possibility of being connected to others (Hui, 2016, p. 24). Thus we can understand the logic within the digital object as recurrent causality, and the digital object satisfies the first essential characteristic in Simondon's definition of technological individualization.

3. The relationship between digital objects and their environment

The environment in which the digital object is embedded is also called its associated milieu. The associated milieu does not exist only within the individual but is a mechanism that acts between the individual's internal and external environments. Again, take the example of relational databases. When I studied computer science at college, the teaching of the database was arranged in my junior year. We first learned basic courses such as C Programming Language, Computer Organization, Data Structures, Operating System, Object-Oriented Programming, and Computer Networks. It is because that we cannot use this digital tool without understanding the background environment and programming language required to run a relational database. After having sufficient knowledge of computer science, we can know how to implement the functions of relational databases. Therefore we will say that a relational database has its associated milieu. For a broader range of digital objects, Internet Protocol, algorithms, data structures, and databases become their associated milieu, which must also include mechanisms to regulate it to be stabilized by the system in which it resides. The evolution and concretization of these mechanisms allow digital objects to develop and integrate their own associated milieu, referred to as technical individualization by Simondon (Hui, 2016, p. 57).

4. The relationship between digital objects and humans

This section will discuss how to construct the relation between humans and digital objects based on Simondon's interpretation of the relationship between technological objects and humans. Simondon (2017, p. 81) argues that: Man has performed the role of the technical individual for so long that the machine, after it has become a technical individual, still looks to be a man taking the place of another man. Although, in fact, it was man who provisionally replaced the machine until truly technical individuals could develop. Man has learned to be a technical being, to the extent that he believes that once the technical being becomes concrete, it will begin to illegitimately usurp his role, generating ideas such as machines taking away workers' jobs.

In the 19th century, Marx proposed the alienation of labor to describe the relation between machines and workers, arguing that labor is external to the workers and does not belong to their essential existence; therefore, they feel unhappy in not identifying themselves in their work (Marx, 2009, p. 74). In Marx's study, the analysis of alienation focuses on the fact that workers do not own the technology or the machines they operate, which are called "fixed capital" and belong to the capitalists. Workers do not own their production tools, so they are alienated. However, Simondon's interpretation of the workers' alienation is different from Marx's. In his view, on the one hand, the capitalist, as the owner of machines, is only concerned with the productivity gains and economic effects but does not understand what is happening inside. On the other hand, as operators of machines, workers are confronted with simple tools that appear as technical elements in handicrafts before entering the factory. They construct their bodies as technical individuals by learning to use these tools. Then in the factory, where the automatic machines are the technical individuals of the industry, the workers express discomfort when confronted with the machines, continuing to use the bodily postures or habits they had previously established when faced with the tools. There is a situation in which workers have an imagined impression of technology that is inconsistent with the technical reality around them. I believe that as society becomes more digitized, this maladjustment will manifest itself not only in workers confronted by machines but that it will affect eve-

ryone in the future.

Simondon sees a dilemma: both workers and capitalists do not understand technical reality, and he considers it the alienation of technical objects. By association with our daily life, can we explore the alienation of digital objects? The alienation has begun to show up in the various digital technologies with smartphones. Alipay and WeChat Payment have grown in popularity in recent years, and electronic payment technology has penetrated almost every aspect of life. As a digital tool made up of digital objects, it does not need to explain its underlying logic to users. However, the increasingly complex rules of use and the near-monopoly of electronic payments on the market still make us uncomfortable with it. This maladjustment may have been insignificant or tolerable before, but lately, the danger of forcing people to be trapped in an inharmonious relationship with digital objects has come to light. In some cities of China, people are quarantined in their homes because of the pandemic. Electronic payments play a huge role at this time, as people need to buy food and essential supplies in WeChat mini-programs or group purchases in WeChat groups. People who have shown discomfort with electronic payments before, such as the elderly, are left behind in this situation. If they can't accept the technology and use it, they can't buy essential food. Many factors cause such tragedies, but one that cannot be overlooked is that we have not dealt with the relation between technology and human beings well in the past pursuit of technological development and digitalization. For the technical objects that Simondon is talking about, automated machines exist in factories or a particular environment, and people might have space to escape. Today, however, digital objects have penetrated everywhere, and no one who wishes to participate in social life can escape the grip of big data and digital tools. So we have to learn to coexist with digital objects.

5. The application of digital objects' individualization in education

5.1 Exploring a new teaching mode

Using SQL Server 2000 as the database operation platform, focus on grasping the main concepts and characteristics of databases, tables, data types, functions, etc., and then through the introduction of establishing indexes, creating and editing the relationship between tables, so that students can operate databases and tables proficiently, able to establish queries and views, create stored procedures and backup and restore the database. When teaching object-oriented programming in VB, we should focus on the creation of forms, the concept and use of objects, events and methods, and the properties, methods and events of data control objects. The connection method with SQLServer2000, and the use of T-SQL language. Through the analysis of typical programs, (Guo Jianjin & Guo Jianping, 2015) students can comprehend the visual programming ideas of VB, master the method of object-oriented programming, and develop application programs that are both standardized and readable. In the teaching process, the combination of theoretical teaching and experimental teaching is adopted, focusing on cultivating students' practical application ability. Use practical operation and on-site programming demonstration to explain, integrate grammar into specific example programs to explain, and example programs should analyze problems profoundly and representatively, so as to facilitate students' use in the development of actual projects in the future. Students are required to complete the prescribed experiments independently, focusing on the cultivation of students' practical ability.

5.2 Updated the production form of multimedia courseware

Multimedia teaching courseware strengthens intuitive teaching in the classroom and better displays the teaching process in front of students. Through the characteristics of pictures, texts, sounds, images and interactive operations, it optimizes the learning process, attracts students, and mobilizes the enthusiasm of learners. For example, how to establish the structure of C/S and the concept of C/S in the application system will be explained by the method of adding animations. The connection mode of SQLServer2000 database and VB, the realization of each method takes students to practice step by step. In this way, students can truly master this part of the content by watching the courseware while operating, and teachers can efficiently complete the teaching objectives in a short period of time. The teaching methods are flexible, the amount of classroom information is large, and the teaching effect is very good.

6. Conclusion

The article examines the individualization of technical objects proposed by Simondon, analyzes the individualization of digital objects using relational databases as an example, and concludes by discussing the relation between humans and digital technologies. In the introduction of his book, Simondon (2017, p. 18) mentions the ideal human-machine relation in his mind: human is like a conductor, and machines are like performers, and there is an interaction between them. The conductor does not assign the musicians to play in this interaction; rather, the conductor and the musicians have a mutual understanding. The conductor interprets the relationship between all of the performers. Such a relation-

ship can still be viewed as a delightful ideal today. This ideal also suggests that modern technology, which is based on the Internet and computers and is all around us, cannot be the master of our lives. The conductor should not be confused by the player's rhythm, and humans should reserve the ability to grasp the direction of technical development for themselves.

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