Defining an Object of Design by the Means of the Cultural-Historical Activity Theory

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Abstract

Despite a decades long efforts no integrating theoretical framework for design research has appeared, and a need for such one still exist. The paper suggests, that it might be beneficial to start by delineating the object of research, because for example distinction between disciplines are based on the difference of their objects. The paper suggests, that the cultural-historical activity theory (CHAT) might offer a good starting point, and makes an initial effort to define the object of design based on it. The result shows, that the artifact to be designed and used is tangled into a context web of historically and culturally unique relations. The paper hypothesises that the simplest form of this network where the richness of a design situation is preserved, consists of two activities, use and design, that are bound together by the artifact-to-be. The complexity both in breadth (overlapping the area of several disciplines) and in depth (from individual acts to the development of organizations) is in paper seen as a reason why an integrative framework has been slow in emerging. The paper sees also that the result gives support to the existence of a designerly way of knowing, value-laden and related to issues that are local, particular and timely.

Keywords: design theory, integrative framework, design object, design knowledge, context, cultural-historical activity theory, design knowing

Introduction

Design research has from the very beginning been very interested in the nature of design and design theories. The discussion around these issues has already decades long history, and it has currently actualised again, but a common view has still not emerged: “Interest in the development of a united body of knowledge and theory about designing and design is increasing (...). A unified body of work has, however, not yet emerged in spite of extensive research.

1 Presented in the EAD06 Conference, University of Arts Bremen, 29.-31.3.2005 and published in the conference proceedings (CD-ROM) by University of Arts Bremen
undertaken over several decades, across several hundred domains of practice, and from a wide variety of perspectives.” (Love 2002, s. 345).

Even the basic issues are still subjected to a debate, as Clyde Dilnot observes in his keynote talk in the Futureground 2004 conference: “To what extent is the content of design, and therefore the potential content of "design research" artifice? (...) The paper will ask some hard questions, both about research and about whether design might itself pose a challenge to research and whether, therefore, we might need to re-conceptualise (re-design) design research, to set a new (critical and ethical) agenda for it and establish a different relation between knowledge, reflection and interpretation in relation to design.” (Dilnot 2004)

Most of the discussion in design research has been focusing on design theories and design methodologies, while the object of design has not been considered that central. In general, however, it is by means of different objects how disciplines are differentiated from each other, and theories and methods are subordinated to the character of a particular object. As innovation researcher Altshuller has aptly said: “If you were to ask someone how to hunt, you would immediately be asked in return what you wanted to hunt. Microbes, mosquitos, whales are all living creatures which can be hunted. But hunting for microbes, mosquitos and whales takes on three qualitatively different forms. No one would study these three forms 'in general'.”(Altshuller 1988, p.16).

In the core of any design theory there should thus be a clear conception of what is to be designed, but unfortunately such definitions are rare. The purpose of this paper is to suggest one possible definition, based on the cultural-historical activity theory (CHAT), and discuss about the consequences if such starting point is adopted.

**Theorizing about an object of design**

Although straight definitions of the object of design are somewhat rare, all design theories have naturally a more or less explicit or implicit notion about it. Most straightforward would be to think that the object of design is a material thing, the artifact-to-be, but that is obviously a too simple perspective. The space does not allow a wide review, so I will restrict to one particular class of views that I believe is most advanced, the view that the material artifact cannot be treated separately from its “context”, on which there are a number of interpretations. Anyway this rather widely shared view maintains that there is no such a thing than a “pure” artifact, that in design the artefact is always embedded into a web of relations that has to be taken into account and which thus can be seen as part of the object of design.

A good representative of this view is the classic review of product semantics by Krippendorff: “Artifacts are not only instrumental to users (operational context) and constitutive of social realities (sociolinguistic context), but they are also created, produced, marketed, consumed, retired, or recycled, and experiences with them inform a subsequent generation of artifacts.”
In addition to these three contexts (operational, sociolinguistic, and genetic) Krippendorff identifies fourth, ecological context, where products are contributing to the autopoiesis of technology and culture. I will take a freedom to interpret Krippendorff “strongly” – he only says that artifacts can be seen in these contexts, while according to my interpretation, artifacts exist in these contexts; desirable properties may exist with respect to any of these contexts, and design has to take them into account.

Krippendorff's view is one of the most elaborated, but simpler ones pointing to the same direction, in particular emphasising the necessity to connect both use and design are not difficult to find, for example from recent design-oriented doctoral dissertations:

“In conclusion, I argue that in the cases I have studied the design object has been two sided, not only concerning the future artifact but also the hypothetical user activity.” (Tuikka 2002, p. 75)

“Systems development requires knowledge about both use and design because new ideas require grounding in both traditions: in use because new artifacts always must be understood and used in a traditional context; in design because the evaluations and decisions basic to form and function of the artifact are made in a larger context of technological design and use.” (Bratteteig 2003, p. 23)

Buchanan’s visionary paper on the history and direction of design addresses also this issue: “What I believe has changed our understanding of the problem of design knowledge is greater recognition of the extent to which products are situated in the lives of individuals and in society and culture. This has given us two areas of exploration that are, in a sense, mirror images of the same problem. On the one hand, we are concerned to place products in their situations of use. The product then is a negotiation of the intent of the designer and manufacturer and the expectations of communities of use. The product is, in essence, a mediating middle between two complex interests, and the processes of new product development are explicitly the negotiation between those interests.” (Buchanan 2001, p. 14)

The general pattern is thus rather clear, but the issue is not elaborated further: this is about the level of accuracy of descriptions that can be found within current design research. What would be needed for a serious analysis would be a more elaborate model of an artifact embedded in at least two contexts, use and design at the same time, and a possibility to connect in other, additional contexts, as suggested by Krippendorff, and that is what I try to do in this paper. Let us start with a general description of cultural historical activity theory, which will be used as the foundation.

**Cultural-Historical Activity Theory**

Cultural-Historical Activity Theory (CHAT) is a school of thought on the relation and interaction between human and the material and social environment – a kind of theory of practices. Originally a psychological tradition, it has been expanded into a more general, multidisciplinary approach used in a number of other fields. Thus it would be more suitable to call it a
framework, an approach or a research programme. During the last years CHAT has been started to be recognized within some specific subfields of design, in particular in Human-Computer Interaction design and research (a dozen or so CHAT-related dissertations have been delivered, and the first CHAT-oriented HCI design textbook has been published 2004), but this far it has been largely absent from the discussion within the broader community of design research proper.

The are several reasons that make CHAT an interesting approach for design research and for this particular conference. Among the social theories CHAT is unique in that it puts human-made artifacts at the very center of the conceptual framework. CHAT is interested in purposeful human actions (in the context that makes them meaningful which is called an activity, hence activity theory), and a basic idea is that those actions are mediated by material and linguistic tools and instruments. Design can thus be seen as a purposeful change in such mediated relationships.

Here it is possible to present only a few major features of the framework relevant to the theme of this paper. An interested reader is advised to read a more complete overview of CHAT from the HCI point of view in (Kuutti 1996), and other papers in the same volume; papers in a selection from the previous CHAT world conference (Chaiklin & al 1999), or some CHAT classic, like Leont’yev 1978.

**Historical background**

The origin of CHAT is in attempts started already in 1920s by the psychologists to establish a new approach in psychology founded on the ground of Marxism. The foundation of Activity Theory was laid by L. S. Vygotsky during the 1920s and early 1930s. His work was continued by A. N. Leontjev and A. R. Lurija who both developed his ideas further and started to use the term “activity”. A good historical review of that development can be found in (Leontjev, 1989). A Marxist psychology could not be built upon the Cartesian mind-body dualism, but a monistic explanation was needed as a foundation. Thus the starting point of CHAT is that human thinking has both phylogenetically and ontogenetically emerged and developed in practical actions and social interactions in the world, and there is no separate "mind" that could be studied isolated from these actions. A significant further finding was that an individual person is not a “real” unit of the analysis of mind. In the analysis, the purposefulness of actions must be taken into account. Thus, it is necessary to include the minimal context of actions, that makes the actions meaningful for the acting subject. This context, typically a purposeful, social system of actions, is called an activity. There are certain general principles in the framework, namely object-orientation, mediation by culturally and historically formed artifacts (tools and signs), hierarchical structure of activity and zone of proximal development.

**Object-orientation**

The most central feature of CHAT is that activities are oriented towards a specific object and different objects separate activities from each other. In the
tradition, the concept of object is complex and loaded. Activities emerge, when human needs find in the world a possibility to become fulfilled. Object is the entity or the state of the world, the transformation of which will hopefully produce the desired outcome. An object has thus a double existence: it exists in the world as the material to be transformed by artefactual means and cooperative actions, but also as a projection to the future – the outcome. The object cannot be exactly given beforehand, but it unfolds and concretises in the interactions with the material and the conditions. (If an end result is completely known beforehand, CHAT does not call it an object, but a goal of an action, a construct of a next simpler level. Being a constantly reproduced purpose of a collective activity that motivates and defines the horizon of possible goals and actions, the “sharedness” of object is present only in social relations across time and space, and embodied also in terms of history. Locally, the sharedness of object is a process of social construction with divergent views and creative uses of cultural and interactional resources. Activities are thus often multivoiced, and none of the existing perspectives on the object can be defined as "right" – that can only be defined within an activity. The object of an activity is not a passive thing to only be manipulated: Arne Raeithel has suggested (Raeithel 1992) that it would be more correct to call the object a “counterprocess”, which does not easily subsume itself under the planned course of actions, but which has its “own will” and which can offer a strong resistance, when formerly hidden connections and necessities are revealed in the process.

**Mediation**

The notion of tool mediation is one of the central features of CHAT. In this view, the of actions are mediated by culturally and historically constituted artifacts – something manufactured by a human being. Thus, our relation with the world is shaped not only by our personal developmental history and experiences from various interactions but also by the history of the broader culture we are part of. The world have been condensed into tools, symbols and signs that we use in our activities. The world does not appear to us as such, “uncontaminated”, but as culturally and historically determined object of previous activities. Humans project both these earlier meanings and and those arisen from the current needs to their objects, and at the same time can see potential results that can be achieved. Language is an essential part of this toolkit, a "tool of tools". According to CHAT, all mediation has both language and material character, symbols and signs, and tools and instruments are both integral parts in the same mediation process. The basic mediational structure is depicted in Fig. 1.
An activity is a form of doing directed to an object. Transforming the object into an outcome motivates the activity. An object can be a material thing, but it can also be less tangible (like a plan) or totally intangible (like a common idea) as long as it can be shared for manipulation and transformation by the participants of the activity. It is possible that the object and motive themselves will undergo changes during the process of an activity; the object and motive will reveal themselves only in the process of doing. Mediation is carried out by introducing a third, intermediate term which carries with it the history of the relationship. Thus the (reciprocal) relationship between the subject or actor and the object of activity is mediated by a "tool" into which the historical development of the relationship between subject and object thus far is condensed. The "tool" is at the same time both enabling and limiting: it empowers the subject in the transformation process with the historically collected experience and skill "crystallized" to it but it also restricts the interaction to be from the perspective of that particular tool or instrument only - other potential features of object remain “invisible” to subject (Figure 1).

**Overall structure of activities**

After the founders of CHAT, new forms for depicting activity have been elaborated. The most influential attempt to model an activity has been done by Y. Engeström in (1987). “The model of activity system” aims at pointing to a historically and concretely constituted system that has a timespan and internal transformations of its own. The model is presented in Fig. 2.
In Figure 2, the model of individual action in Figure 1 has been complemented to depict a collective activity system. The model looks at the activity from the point of view of one actor, the subject, but the fact that subjects are constituted in communities is indicated by the point in the model labeled "community". The relations between the subject and the community are mediated, on the one hand, by the groups full collection of "mediating artifacts" and, on the other hand, by "rules" that specify acceptable interactions between members of the community, and "division of labour", the continuously negotiated distribution of tasks, powers and responsibilities among the participants of the activity system (Cole & Engeström 1993 p.7)

In an activity the relation between individual actions and the outcome of the whole activity becomes mediated and indirect. Leont'yev (1978) explains the relation between individual actions and collective activity with an example about primitive hunters who, in order to catch a game, separate into two groups: the catchers and bush-beaters frightening the game towards them. When compared with the motive of hunting – to catch the game to get food and clothing material – the individual actions of the bush-beaters appear to be irrational unless they are put into the larger system of the hunting activity. Although the “triangle” model presented above may look somewhat rigid, it is only for the sake of representational simplicity and convenience. It is important to remember that CHAT does not consider activities as "given" or static entities, but dynamic ones: activities are always changing and developing. This development is taking place at all levels: new operations are formed from previous actions when participants' skills are increasing; correspondingly, at the level of actions the scope of new actions is enlarging -- but also totally new actions are invented, experimented and adapted as responses to new situations or possibilities encountered in the process of transforming the object; finally, at the level of activity the object/motive itself (and the whole structure of activity related to it) is reflected, questioned and perhaps adapted, reacting to larger changes and other activities.
Because activities are not isolated units but more like nodes in crossing hierarchies and networks, they are influenced by other activities and other changes in their environment. External influences change some elements of activities causing imbalances between them. CHAT uses the term *contradiction* indicating an unfit within elements, between them, between different activities or different development phases of a same activity. Contradictions manifest themselves as problems, ruptures, breakdowns, clashes, etc. CHAT sees contradictions as sources of development; real activities are practically always in the process of working through some of such contradictions.

**The object of design**

It is in fact rather amazing, how faithfully the description of the object of an activity, developed within originally a purely psychological research tradition and without any connection to design whatsoever, characterizes some of the features of design: organizing role of the thing-to-be for the whole enterprise, the unfolding of the object during the course of action, and the always locally limited horizon of possibilities, the existence of a counterprocess – probably everybody involved in practical design has bitterly experienced, that the object of design does not only lie passively down and wait to be manipulated, but it has a powerful capacity to stand up and kick back – and so on.

This similarity between the qualities perceived in design and those designated to an object of a general activity, give some creditability to a claim that "everything is design", expanding the scope of design to contain everyday actions and making it a most fundamental feature of human existence, made for example by Simon (1969) and Nelson & Stolterman (2002). There is no need to explore that issue here further. My personal view is, however, that although this claim can be defended, and it certainly raises the status of design, expanding the scope that far will dilute the analytical and explanatory power of the concept of design rather useless. I would prefer to limit the concept of design to be used in the situations where an artifact is purposefully created for others to use – which is the situation we are actually interested in.

After seeing the structure of one activity the first approximation for our model is not very surprising: it is made just connecting two activities – use and design activities – by the emerging artifact-to-be which serves both as the object of the design activity and as the instrument in the use activity (Fig. 3).
An object of design is thus something which is constantly oscillating between something to be created and something to be used, and neither of thee views does exist in a vacuum but in a real historical situation, where a multitude of dependencies and relationships is constantly influencing what can be done. I would like to claim (or hypothesise, to be exact), that the structure in Fig. 3 represents the minimal model of an object of design embedded in its network, where “enough” of the actual richness and complexity around the artifact-to-be involved in design is still preserved for it to be useful for analysis, for example. With respect to the description by Buchanan and Krippendorff presented above it obviously covers the Buchanan characterization, and Krippendorff’s operational and genetic contexts. Because the concept of tool or instrument covers also signs and symbols, we can also read that instead of use the other activity is signifying, or perhaps even think that these both interpretations can co-exist as overlays – but only as long as the object and community stay the same. Because that is not necessarily the case – I will use this artifact as a tool to transform this object with this community, but at the same time my possession of the same artifact transforms my image in the eyes of that different community – this minimal model cannot cover all the situations Krippendorff’s classification defines. So some enlargement will be necessary. And Krippendorff’s ecological context would need even larger frame of reference.

It is, however, relatively easy to expand the minimal core model to cover more aspects of a situation or more complex situations, and I will next show a couple of examples. Let’s us first enrich the use activity. One of the typical distinctions in the use side is the separation between the current use and the future use, possible only with the emerging artifact-to-be. Taking this into account would lead us to the following network (Fig.4), by using which for example the tensions between old and new way of working can be discussed. In a similar vein it would be possible to enrich the design side, where a typical distinction and a source of tensions is the separation of design from actual
fabrication of an artifact (this network is not depicted due to the space limitations).

![Diagram showing designer's tools, object-artifact-tool, design community rules and culture, design community, division of design work, current user activity, emerging new activity with new tool.]

Fig. 4. Adding activities to enrich the core model: emerging new activity versus the existing one.

Here the right side of the model separates between old and new use activities, but this is not the only possibility. It is possible to describe also other potential activities, where the new artifact has a role – like the Krippendorff’s signifying activity, or other contexts.

My other example of extending the core model deals with power and priorities. Why does the design process exist in the first place? What is the purpose? Again, it is possible to add more activities to the model, in this case in a hierarchical fashion. Some actor is using the design process instrumentally to transform some situation for benefit, and that can also be made visible (Fig. 5). With this sort of enlargement, the power play by the community around the design can be discussed.
Fig. 5. The design process used instrumentally by another activity

The two enlargements are only examples (an not necessarily very good ones) how the core model and the activity structure can be used to describe different situations in and around design.

Discussion

What does this mean, apart from naming the elements and charting the relations? At least that design, and hence also design research, has an unique, complex object which clearly sets it apart from other disciplines both with respect to the scope of knowledge and the nature of it. The suggested model of the object of design sheds some light why it has been so difficult to develop a comprehensive “theory” of design, despite the long efforts. First, the suggested object spans over several levels of complexity, from the details of individual acts of using an artifact to the historical dynamics of socio-material activity system, when a new way of working emerges due to the use of a new artifact and even beyond that, to the relations between different activity systems. It is far more typical that successful theories in different disciplines try to cover objects residing at only one particular “level”. Besides the “depth”, the object is also very “broad”: the suggested object consists of elements and relations belonging to the realms of half a dozen already existing disciplines. Thus the object is large and integrative, or to use a popular term, “interdisciplinary”: a typical scope of a traditional discipline is restricted to isolated elements or subareas of the whole network described above. An integrative or interdisciplinary approach has to develop its own knowledge: “…interdisciplinarity is always transformative in some way, producing new forms of knowledge in its engagement with discrete disciplines.” (Moran 2002, p. 16). It is pretty obvious, that any knowledge that has emerged within a isolated perspective of some individual element or relation of network of design, must be scrutinized and re-interpreted with respect to the whole
network before it can have some value for design. Thus best we can say is that the other contributing disciplines may “inform” design -- the suggestion strongly supports what Nigel Cross (Cross 2001) has called a “designerly way of knowing”. Anyway, integrative interdisciplinary theory covering a large area is something that can hardly be “cooked up” by any individual researcher, but it can only emerge in an sustained effort of a larger research community.

The other major issue is the nature of the knowledge used and produced in design and design research, which also runs counter to traditional disciplines. Traditional research – be it in natural or in human and social sciences – aims to produce knowledge which is general, global, timeless and value-neutral. Design is necessarily dealing with local, particular and timely, an artifact is designed to be used at a particular moment for a particular purpose by a particular group of people. Design research, whose aim is to develop intellectual and practical tools for design work, has necessarily the same point of view. It is fully possible that there are areas of general and timeless knowledge that can be applied to design, for example in ergonomics (although even the basic knowledge about humans may change historically, like the growth of medium length of people shows). The more this kind of general knowledge can be extracted, the better. But it is obvious, that a large portion of knowledge needed in design will always be bound to a particular historical situation – both with respect to the culture and the status of available technology. And design is about values: the very core of all design work is the capability to introduce “better” solutions, and “better” is always respect to some values. Thus values guiding the design must be identified, and openly discussed and accepted.

The exploration suggests also, that although CHAT is not a design theory as such, it could be a promising foundation upon which one might be constructed. The minimal model presented here could be seen as a seed for such effort.

As a final remark – a theory of creativity has been one of the areas where the restless polymath Arthur Koestler did try his hand (Koestler 1970). While the details of his theory may be largely forgotten, the central conceptual foundation – the bisociative matrix – has stayed alive and is still often used and referenced to in creativity research. The principle of bisociation means that an issue of interest is brought under study at the same time within two in some ways incompatible frames of reference. The tension generated is seen by Koestler as a major springboard for creativity.

It is interesting to note, that in the hypothesis presented above one such bisociative matrix is built-in in the very core of all objects of design.

References


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