



DESIGNING SMART OBJECTS IN EVERYDAY LIFE

Intelligences, Agencies, Ecologies

**Edited by
Marco C. Rozendaal,
Betti Marenko and
William Odom**

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2 DRAMATURGY FOR DEVICES: THEATRE AS PERSPECTIVE ON THE DESIGN OF SMART OBJECTS

Maaïke Bleeker and Marco C. Rozendaal

In this chapter we reflect on how insights and expertise from the theatre can inform the conceptualization and design of smart objects in everyday life. In the field of human-computer interaction (HCI), theatre has a history of being referred to as a generative metaphor in the design of user interfaces of computing systems. In her pioneering work, Brenda Laurel (1993) proposes theatre as model for interface design and for navigating the virtual. She developed her perspective on 'computers as theatre' in the midst of the multimedia revolution and in relation to the virtual worlds existing within the computational spaces opened up by computer interfaces. Laurel shows how insights from the theatre, in particular Aristotle's poetics, are most useful for what she describes as 'a dramatic theory of human-computer interaction' (xvii). Building on the tradition set by Laurel, we too propose theatre as a perspective on design, albeit not of computer interfaces but of smart objects and their modes of performing. Unlike the virtual, other worlds opened up by computer interfaces, smart objects exist and operate within the real material world of users. In this context, we will show not Aristotle's theory of dramatic narrative, but how dramaturgical concepts and insights regarding staging situations in the here and now can provide designers with conceptual tools to understand and design the interaction between humans and smart objects embedded in shared environments.

The term 'dramaturgy' is used to refer to the totality of all aspects that are part of how theatre performances are constructed, the relationships between these elements and how these relationships unfold in time and space. This may involve storytelling (as in dramatic plays), but not necessary so. Performances can also be organized according to other logics and other compositional principles such as that of montage, visual composition, choreography or gamelike structures. Performances can be constructed to take the audience along in experiences and associations by means of compositions of materials that do not tell a story or represent another world but set up a situation in the here and now. Doing dramaturgy in the context of the theatre involves paying attention to how performances do what they do as a result of how they are constructed. Dramaturgy thus understood is not itself an approach to designing performances, but rather consists of a set of tools, terms and insights to think through the logic of (real or fictional) situations and how they afford interactions and interpretations, suggest interpretations and trigger actions and associations.

In traditional Western theatre – that is, the kind of theatre that is based on the ideas of Aristotle as used by Laurel – the various elements of theatrical staging and the ways in which they are brought together are used for the representation of fictional worlds. Like computer interfaces, the means of the theatre here serve first and foremost to provide access to 'virtual' other worlds. Ever since the early twentieth century, however, avant-garde theatre makers have developed new strategies of creating theatre that foreground the here and now of the theatrical event, its materiality and embodiment, and its mode of addressing the audience in shared time and space. In such theatre, attention shifts away from narrative and representation of other worlds (central dramaturgical principles of Aristotelian theatre as used by Laurel) and towards the composition of human and non-human performers, the things, sounds, texts and movements that together make up the theatrical performance. In the following, we will show how insights in these aspects of theatrical performance may support an ecological approach to the design of smart objects that starts from the relationships defining the situation in which the smart object is to operate in and from how the object negotiates these relationships, building on them, or intervening in them, and transforming them. We will also discuss how this approach invites a reconsideration of what constitutes the 'objecthood' as well as the 'smartness' of smart objects in relational terms. We will do so using the project *Mokkop* as our design case. Although dramaturgy was not part of the design process of *Mokkop* (see Vermeeren, van Beusekom, Rozendaal & Giaccardi, 2014), we will use *Mokkop* as our example of how dramaturgical concepts and insights such as 'mise-en-scène', 'performativity', 'presence' and 'address' may support further understanding of what happens in the design process and may contribute to further developing ecological approaches to design.



FIGURE 2.1 Impression of *Mokkop*.

Design case: *Mokkop*

Mokkop was designed by Josje van Beusekom in the context of her master graduation project at Delft University of Technology in collaboration with the Princess Máxima Centre for Pediatric Oncology. The aim of the project was to develop a product to support parents of hospitalized children to take time for themselves (Figure 2.1). Children diagnosed with cancer often have to stay in the hospital for extended periods of time. It was observed that the caregivers staying with them, focusing all their attention on the children and being absorbed in care and worries about them, tend to become lonely and isolated. *Mokkop* was developed as an intervention that aimed to prevent this from happening, or at least make it less extreme. To this end, van Beusekom created a series of coffee cups that have the capacity to glow and show intricate patterns of light at various moments during the day. Parents and other caregivers accompanying small children who are hospitalized are invited to select a cup of their choosing. The cup looks quite ordinary for most of the time, apart from five times a day when it starts to glow. Caregivers are invited to take this as a suggestion that it might be time for a cup of coffee, or a small break. At the same time that the cup of one caregiver starts to glow, the cup of another caregiver in a nearby hospital room does so too. The cups thus make an intervention in the given situation that sets the stage for taking a break and for a meeting at the coffee machine. Caregivers are not ordered or forced to actually go to the coffee machine or engage in a chat. Rather, this possibility is implicated in the design as a potential for action and experience, an invitation they can choose to respond to.

An ecological approach to design

Mokkop is an interesting example of what can be called an ecological approach to design: an approach that starts not from designing an autonomous entity to be put into an environment, but rather from how the object to be designed might tap into not yet realized potential immanent to the environment and actualize it. Such an ecological approach to design is not necessarily about consideration for the environmental impacts of the product (as proposed by Van der Ryn & Cowan, 1995). Rather, it follows Félix Guattari's (2000) extension of ecology to encompass social relations and human subjectivity as well as the material environment, and looks for ways to actualize potential immanent within this ecology. Peter Trummer (2008), developing Guattari's (2000) elaborations on ecological thinking as an approach to engineering, describes this immanent potential as the virtual dimension of the environment. Virtual, thus understood, is not something fictional. In line with Gilles Deleuze's understanding of the virtual, both the actual and the virtual are fully real. The former has concrete existence while the latter does not, yet (Buchanan, 2010).

The challenge of ecological design then is to recognize possibilities that are virtually present within what is actually there, how these may provide solutions to design questions and how these virtual possibilities can be actualized by means of design interventions in the environment. This is how we may describe what happened in the design process of *Mokkop*. The object of design here is not merely a thing (the cup) that is then put into an environment, but the intervention made by the cup that mediates in actualizing the potential for taking a break and for having a chat with a fellow caregiver at the coffee machine. The design of *Mokkop* involves quite literally an intervention (the lighting up performed by the cup) that invites to actualize a not-yet-realized potential given in the set-up of the environment. Such actualization is truly ecological in that what is designed and the environment are part of the same becoming.

Insights from theatre may contribute to developing awareness of such potentiality and to how it can be put to use for design purposes. Making theatre is all about setting the stage for the emergence of what is not yet there, about recognizing the potential of relationships between people and things within situations, and the potential of well-chosen actions to intervene in situations in ways that set them into motion. Furthermore, theatre is all about doing so in relation to the expectations and assumptions of human users, called spectators. Theatre is constructed with spectators in mind and in order to invite certain ways of understanding rather than others, to trigger certain emotions and associations rather than others, and (in certain types of theatre) even to make spectators do certain things rather than others (for example, in participatory theatre, theatre of experience, or other types of theatre that require actual activity of the audience).

Making theatre requires understanding of how to play into and play with expectations, conventions and culturally and historically specific ways of looking, doing and understanding. Finally, theatre provides a relevant model for designing smart objects in how it redirects attention with regard to what the object of design is. A theatre performance consists of a great number of different elements (including things, humans, texts, movements, sounds, etc.), and its objecthood is to a large extent given in how the theatrical apparatus sets up relationships between these elements and with an audience. Similarly, we might argue that what is being designed when designing a smart object is not merely an autonomous thing, for example, a cup, but how this cup actualizes relationships within an environment. Designing such objecthood requires precise insight in what in dramaturgical terms is called 'mise-en-scène'.

Mise-en-scène

Mise-en-scène describes in a broad sense the arrangement of 'all of the resources of stage performance: décor, lighting, music and acting'. In a narrower sense, 'the term "mise-en-scène" refers to the activity that consists in arranging, in a particular time and space, the various elements required for the stage performance of a dramatic work' (Pavis, 1998, p. 363). Mise-en-scène can thus be used as an analytical term that draws attention to the specificities of this arrangement in an already existing theatre performance. It can also describe the practice of creating such arrangements. In both cases, mise-en-scène draws attention to the composition of the arrangement in time and space and how this arrangement affords the unfolding of action. Mise-en-scène provides a conceptual tool for designing smart objects that directs attention to the situation in which the smart object is to operate as a spatio-temporal arrangement of humans and things, as well as to the identified relationships between the arrangement of the situation and the actions and experience of the people within this physical and social context, their interdependencies (human, object and environment) concerning the state-of-the-world as it is as well as how it could be like.

The design process of *Mokkop* began with an investigation of what we might call the mise-en-scène of the situation of the caregivers in the hospital and how this mise-en-scène sets the stage for their actions. In the design process this involved conducting user research that helped designer van Beusekom to understand hospitalization from the perspective of the family, concerning their needs, experiences and problems they face. A careful analysis of the hospital architecture provided van Beusekom with an understanding of the physical layout of the patient, room, waiting areas and hallways. Observations being done in the hospital provided additional information about how the setting relates to the activities that take place there, and interviews provided information about the

feelings they trigger. Van Beusekom developed her design vision by identifying the barriers such as the current situation of the child, having a reason to carve me-time, finding the right moment as well as what might help caregivers to take a moment to relax. These insights in the current situation and the identified opportunity for an intervention that might actualize a still unrealized potential of this situation set the stage for *Mokkop* to crystallize as a design concept: a cup as an actor capable of bringing about the desired change in the given situation. This capacity of bringing about a new situation is what we may call the performativity of the cup.

Performativity

Performativity entails understanding how what kind of behaviour of what kind of object may bring about the desired change within a given *mise-en-scène*. This understanding of performativity is based on speech-act theory as introduced by John Austin (1975) and John Searle (1969) and further elaborated by Judith Butler (2007) and, more recently, by (among others) Jon McKenzie (2001) and Karen Barad (2007), drawing attention to the performativity of technology (technoperformance) and presenting a post-humanist perspective on performativity. These theories help to understand that saying things and doing things have the power to 'bring about' things within the situation in which they are performed. The canonical example of speech-act theory is that of the wedding vow transforming two unwedded people into a married couple. This power of words and actions to bring about identity and situations, as well as intervene in them and transform them, is well known to theatre makers too. With only a few words whole worlds can be evoked on stage. Puppet- and object theatre makers have shown that well-chosen movements can produce a sense of character and 'aliveness' in almost any kind of object. Playwrights like Chekhov have demonstrated how simply the entrance of a character at a well-chosen moment can be an intervention that completely changes the entire situation on stage.

Performativity is not a matter of what an object (like e.g. the cup in *Mokkop*) does per se (its performance) but describes what this doing brings about within the given situation. This requires understanding this object as an agent ('actant', Latour) within a network (apparatus) of relationships of multiple human and non-human agents that mutually influence each other, and in which the object can act as a mediator in complex physical and social settings. Following Barad, we might say that it is within the context of a given apparatus (i.e. within a particular network of relationships between humans and things) that an object (like the cup in *Mokkop*) gains the agency to intervene and bring about a change. Designing a smart object, therefore, requires recognizing what kind of behaviour of what kind of object has the potential of mediating in bringing about the desired change. It also involves recognizing that what may appear as the 'character' and the intentions of a smart

object are the effect of what it does and how, and how this can be interpreted within the given situation.

Mokkop demonstrates that the performativity of the smart object is not a matter of an object successfully expressing the intention of bringing two people together at the coffee machine for a chat. Rather, key to its design was figuring out what kind of performance of what kind of object would be able to generate the desired action of the caregivers. Furthermore, the agency of the cup (its capacity to bring about this change) is inseparable from the situation. The same behaviour in a different situation would not necessarily have this potential. The performativity of *Mokkop* is the result of a combination of the choice for a cup, the design of the cup, its specific way of performing and the situation in which this happens (including the availability of the coffee machine, the material arrangement of the refreshment room and the presence of more than one caregiver). That is, it involved all kinds of things that are crucial for the intervention to have the desired effect but are not directly part of the design of the cup as object in itself. Achieving the desired behaviour of the caregivers also involved working out the 'time table' of different sets of cups glowing at different moments, the rhythm of five times a day and how they should make themselves present. For although the cups are there all the time, their capacity to successfully intervene in the situation and bring about the desired effect requires them to draw attention to their presence five times a day.

Presence

In his *Dictionary of the Theatre*, Patrice Pavis observes that 'to have presence' in theatre jargon means knowing how to 'captivate the audience' (1998, p. 285). Presence is an ambiguous concept in how it is associated both with something some people know how to do (knowing how to captivate the audience) and with a quality that one simply has or has not. It is certainly the case that some actors manage to captivate their audiences better than others, while this capacity also appears to be context dependent. Actors endowed with an impressive stage presence do not necessarily have a similar strong presence in daily life. This seems to suggest that their presence is situated and related to the context of the stage. Yet, although stage presence can be enhanced by theatrical means like, for example, light (putting someone or something in the spotlight), composition (like in ballet, where the composition of the corps de ballet directs the attention of the audience towards the soloists), costume or the performance of co-performers (like the stooge in a comic duo), some people and some things seem to be better capable of captivating the audience than others.

Different modes of presence and the effect of ways of increasing presence are also an important part of the design of *Mokkop*. Central to *Mokkop's* mode of operating is the precisely timed and organized becoming present of the cups five

times a day, and how this transformation of their presence presents an invitation to the caregivers. The cup is there all the time, but crucial to its modes of operating is that it makes itself present at specific moments and how such presencing draws attention to its existence. Using light rather than sound or movement as a means of increasing the presence of the cup affords a non-invasive way of drawing attention. Sound could easily disturb the precarious situation in the hospital room, wake up the patient or be experienced as annoying when happening at a less appropriate moment. The glowing of the cup can more easily be ignored if happening at a moment the caregiver does not want to respond. If desired, it can do its job without attracting the attention of the patient, especially when placed outside their field of vision. The manner in which the cup makes itself present also implies ways of engaging people in how it invites them to relate to it, understand it and do things with it. This is what is called 'address'.

Address

Insight into how behaviour and looks set the stage for possible responses and thus for modes of interacting with fellow actors as well as with the audience is an important skill for actors. Acquiring such skills involves developing an understanding of how the way one addresses fellow actors or the audience invites, triggers and makes possible certain ways of responding, while foreclosing others. Modes of address affect how the one being addressed is invited to understand what is shown and done, is invited to sympathize or not and so forth. Furthermore, staging involves understanding how not only the actors but also all that is shown and done on stage does things to spectators: how this address evokes a sense of self in the situation and invites ways of responding and understanding. The theatre provides a model for how designing behaviour intended to achieve a particular effect requires taking into account the expectations, assumptions, desires and so forth of spectators or users.

In the case of smart objects, more than is the case with most types of theatre, address is instrumental in making people actually do things. An important question in the process of designing *Mokkop*, for example, was working out what the cup should look, feel and behave like in order for the caregivers to feel invited to pick it up and take a break for a coffee and a chat. This involved working out how the address presented by the cup implies their potential responses and how the design invites or affords ways of responding. It also involved taking into consideration how caregivers in the hospital may feel addressed by the shape, colours and ways of lighting up of the cups, how they will 'read' ways of being addressed and how they will feel invited by them to take action. These considerations informed the choice of material of the cups and how they affect the feel of the cups, what this feel brings about and how this may affect and inform modes of social interaction.

The choice for porcelain rather than plastic was informed by how the combination of softness and strength presents an appeal to tactility and invites picking up the cup and holding it in one's hands. The choice for the specific kinds of patterns of light (abstract rather than figurative) is meant to avoid the address to respond to all too specific tastes and thus speak to some while not to others. The glowing up of patterns of light evokes associations with warmth, thus pointing forward to the possibility of the warmth and comfort of a cup of coffee or tea. Furthermore, the address presented by the lighting up of the cup is quite different from, for example, the address presented by a sound. A sound signal might more easily be associated with a command, while light easily triggers associations with something pleasurable and comforting, and the soft glowing of the cup appeared to have the effect of drawing people towards the cup.

The objecthood and smartness of smart objects: An ecological approach

Whereas Laurel's classical Aristotelian theatre-inspired approach to design invites designers to approach the creation of computer interfaces as the design of virtual, other worlds that we navigate and experience as fiction, our dramaturgy for devices – based on insights from contemporary theatre – supports an ecological approach to the design of smart object that starts from real-world interaction with people in shared environments. We have shown how this approach invites a reconsideration of the 'objecthood' of smart objects in how it shifts attention from design being a matter of giving shape to individual things to design being about relationships and about interventions with the potential to bring about changes in environments and in the behaviour of people. The objecthood of the object of design includes the relationships with the environment and with people. The example of *Mokkop* can serve as an example of an ecological approach to design in how the object of design is not merely the looks and construction of the cups but what these cups are capable of bringing about within the given environment.

Similarly, we argue, an ecological approach to the design of smart objects requires a reconsideration of the smartness of smart objects. From this perspective, the smartness of smart objects is nuanced to be not only a technical computational property of the object but also a relational quality of the object that manifests itself in interaction. Here, too, *Mokkop* can serve as an example: the smartness of *Mokkop* is a matter of the fittingness of the behaviour of the object within a specific setting and about how, within this setting, this behaviour is capable of bringing about desired effects. This understanding of smartness is at odds with the idea of the smartness of smart objects being a matter of some kind of artificial brain being implanted in autonomous objects, like Cartesian minds in machinic bodies. Even though the design of *Mokkop* does include (rather basic) electronics implanted in

the cups controlling their glowing behaviour, the smartness of the object and the capacity of the design to bring about the desired effect is not a matter of how smart this electronic 'brain' is but of how the behaviour of the cups is designed to afford potentialities of the environment to be actualized. That is, smartness is not a matter of a computational system acting like a mind to an autonomous body-machine but of how the doing of the object is designed to intervene in the environment and to bring about meaningful actions of human users.

We have shown how our dramaturgy of devices supports the development of the objecthood and smartness of smart objects, and how dramaturgical insights regarding *mise-en-scène*, performativity, presence and address offer conceptual tools to support and further develop various aspects of ecological approaches to design. In the following, we will discuss how a dramaturgy of devices relates to current approaches and issues in the field of design, and how it may contribute to an interaction design research agenda.

Dramaturgy and interaction design

A dramaturgical approach supports a distanced yet empathic relating to a particular context and opens up the designer's eye to this situation as meaningful and complex, and as something that is enacted. As such, it contributes to design methods that emphasize human experience in relation to the social contexts and practices in which they are situated (Crabtree, Rouncefield & Tolmie, 2012; Kuutti & Bannon, 2014) and how objects situated in these contexts mediate human activity (Kaptelinin & Nardi, 2006) and ways of 'being in the world' (Verbeek, 2005). Participatory design has a rich tradition in how to involve people to help uncover the potential of what a particular situation or context could be like (Sanders & Stappers, 2012; Vines, Clarke, Wright, McCarthy & Olivier, 2013) and how this may involve consulting 'things' as well (Giaccardi, Cila, Speed & Caldwell, 2016). Contemporary theatre too has a lot to offer with regard to such collaborative creation processes involving the participation of professionals as well as non-professionals in making theatre on stage and in real-world settings. A dramaturgical approach further resonates with in-situ prototyping (Chamberlain, Crabtree, Rodden, Jones & Rogers, 2012) as being a continuous dialogue between the to-be-designed object and people in particular contexts of use, which allows its performativity to be explored and orchestrated.

Smart objects are considered to have particular kinds of agencies that scholars describe as originating from 'quasi-subjects': objects that delegate agency inscribed by others but that seemingly originate from the object itself (Latour, 1993; Bødker & Andersen, 2005). Designing interactions with such objects requires careful thought about who or what has the initiative and who or what controls how the interaction unfolds. Notions such as 'negotiation' (Frauenberger, this book),

'collaboration' (Rozendaal, Boon & Kaptelinin, 2019) and 'co-performance' (Kuijjer & Giaccardi, 2018) are concepts that address these particular agencies and acknowledge how outcomes of the interaction are co-produced. Here, a sense of humbleness is warranted. As designers are not able to dictate how smart objects will exactly enable change but can only influence how the object invites to action, designers should think about how smart objects speak to human creativity and how they allow for improvisation and appropriation (D'Olivo, van Bindsbergen, Huisman, Grootenhuis & Rozendaal, 2020). Here, dramaturgical insights in (already mentioned above) 'address' and 'performativity', as well as a rich body of knowledge regarding the staging of interactions and various types of improvisation could provide useful additions to the designer's toolkit and support an understanding of interaction as an emergent phenomenon in which humans and objects participate.

An important aspect of organizing interactions between humans and smart objects is timing. Interaction episodes between humans and objects are of a certain duration and can be repetitive over time. To become embedded in particular contexts, objects need to act in synchronization with human behaviour and adapt to ongoing activities and routines. This indicates how temporal aspects of smart objects are both linear and cyclic (Engeström, 1999). For instance, linear temporal aspects may relate to how an object's intent and intelligence is expressed in interaction through its form and behaviour (Vallgård, 2014) while cyclic temporal aspects relate to how an object can establish a presence over time by interacting and being present in particular moments. This further alludes to thinking about what meaning objects have 'in-between' interaction episodes (Odom *et al.*, 2014). Time, timing and temporality are also important to the construction of theatrical performances and how they engage audiences. Expertise from the theatre with regard to ways of structuring time, marking of time, rhythm, expectation management and 'attunement' would make most useful contributions to a smart objects designer's toolkit.

How to design the character of smart objects? Lars-Erik Janlert and Erik Stolterman (1997) define the character of artefacts as the unity of an object's multiple characteristics, which involves the sustained impressions of aspects of the object's function, appearance and manner of behaving, aggregated over time in a complete and coherent way. This relates very well to dramaturgical insights in character as an emergent phenomenon. Like smart objects, characters on stage do not have a pre-existing inner identity that expresses itself. What appears as character is brought about by what they look like and what they do and how others respond to them. In the theatre, characters are often performed by humans, but not always. Objects can be performers too. The character of Tinkerbell in *Peter Pan*, for example, is traditionally performed by a light. Object theatre makers have shown how all kinds of objects can be turned into partners in performance. The skills and aesthetic sensibilities required to animate objects are increasingly recognized

as valuable assets in the design of smart objects and social robots (Hoffman & Ju, 2012; Bianchini, Levillain, Menicacci, Quinz & Zibetti, 2016; D'Olivo, Rozendaal & Giaccardi, 2017). Here too, it seems, a lot is to be gained from bringing together dramaturgical expertise and interaction design.

Conclusion

Brenda Laurel's *Computers as Theatre* has greatly influenced the design of human-computer interaction and contributed to the development of virtual worlds in ways that are more human, emotional and understandable. With our dramaturgy for devices we propose to take her approach in a new direction and draw attention to the potential of knowledge embodied in more contemporary and less representational types of theatre for the design of smart objects. Inspired by Laurel's pioneering work, we propose combining insights from the theatre with competencies and skills that trained interaction designers are familiar with, as a useful addition to the smart object designer's toolkit. A dramaturgy for devices supports an understanding of smart objects as entities that actively form relations within ecologies of people and things, intervene in such ecologies and bring about changes as a result of these interventions. It also supports an understanding of the intelligence of smart objects as given in their ability to establish relationships and effect transformations. Insights from the theatre have a lot to offer for the further development of such relational approaches to the objecthood and smartness of smart objects in ways that do not start from mimicking human or animal intelligence but rather from how the smart object inhabits an ecology of relationships. Being designed to both fit in and actualize unrealized potential of these ecologies, smart objects present an image of intelligence and of agency as inseparable from the environment and from the entities' potential for (inter)action within it. This is an understanding of intelligence and of agency in line with Latour and Barad's observations on how it is from its being part of actor-networks or apparatuses consisting of human and non-human elements that entities gain agency. With our dramaturgy for devices we propose the theatrical apparatus as a model to think through the inseparability of the smartness of the smart object and the ecology within which the object operates, and expertise from the theatre as a rich source of knowledge about creative engagements with ecologies and their performative inhabitants.

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