

What Can the Hundred Languages of Children Teach Us?

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Abstract

In this paper we want to make use of the "Hundred Languages of Children" observed by Reggio pedagogue L. Malaguzzi, in order to understand the process of being engaged by and engaging with software. These languages allow children to appropriate objects on many levels. Here, we are interested what this means for usage of software and whether we can learn from them. We will take a close look at the reciprocal aspect of engagement, in particular with respect to software, and derive its relationship with imagination and conceptual metaphors. Concretely, we study the conceptual metaphors used by three children appropriating a software package that was definitely not designed for children, but for adults: MS PowerPoint (PPT). We contrast these use metaphors with the one that is expected for teachers in a PPT training unit. We can learn from these distinct attitudes, that not only the software (designers) are responsible for engagement, but the "language" of conceptual metaphors for software use as well.

1 Introduction

Designers are thrilled when engagement is an effect of their interaction design. But what does "engagement" with respect to software *really* mean? In order to approach an answer we take a closer look at today's specialists for engagement with software: children growing up as "*Digital Natives*" (Prensky 2001) with resulting expectations towards the world in form of an "*Engage Me or Enrage Me*" attitude (Prensky 2005). Reggio pedagogues like Loris Malaguzzi argue that children are engaged by and engage with objects in manifold ways - as they speak a hundred languages (Edwards et al. 1998). Therefore, we were interested how children might trifle with a software package that was definitely not designed for children, but for adults: MS PowerPoint (PPT). Among academics its use, utility, and usability is fervently debated (e.g. Tufte 2006; Coy 2006; Parker 2001; Kohlhase 2006b; Atkinson 2004a/2004b; Shwom & Keller 2003), but innocently enjoyed by many children (e.g. Putney et al. 2004; Yost et al. 2003). For our analysis we contrasted children's reports on PPT with a PPT training unit for teachers. The latter was especially designed to empower teachers to start using ICT in classroom. In contrast particularly to training units for business or admin-

istrative staff, we hoped to find there a different view on the all-too-well known PPT use just for presentation.

The difference between the observed PPT approaches is stunning, it consists in the underlying metaphor for using the software: the creators of the training unit expect users to use PPT as a "presentation-enabling tool", whereas our young subjects described it as "theatre", "movie crew", or "archive". If we consider B. Laurel's comparison of engagement with the *"theatrical notion of the 'willing suspension of disbelief'"* (1991, p.113) against this metaphoric background, then the distinct approaches to PPT and its resulting engaging effects become intelligible. We can learn from this contrast, that not only the software or its designers are responsible for engagement, but the users, particularly their conceptual metaphors for software use, as well. Note that in an educational context we might be able to influence these conceptual metaphors by embedding software in an appropriate environment.

2 Engagement, Imagination, and Conceptual Metaphors

Unfortunately, the terms "engagement", "imagination", and "metaphor" are quite often used in a very simplistic way and their interdependencies are sometimes hidden. Therefore, we try to reestablish their original richness and showcase their respective relevance with the "New Media" (Manovich 2001).

For a first ditch into the meaning of "engagement" with respect to software, we start of with a definition given on theFreeDictionary.com: *"**Engagement** is the act of engaging or the state of being engaged, where 'to engage' means 'to attract and hold the attention of, to engross, to draw into, to involve (oneself), to participate"*. Note that engagement is conceived as a bidirectional relation, i.e. software might engage a person and a person may engage in software. In particular, if we speak of "engaging technology" we have to consider not only its technological potential but also the person's perception of the specific technology, especially its feelings and attitudes towards it.

In B. Laurel's compelling book "Computers as Theatre" (1991), she looks for expertise for human-computer interaction and posits it with dramatists. In particular, she argues that **"interactivity"** is the *"ability of humans to participate in actions in a representational context"* (p.35) and coins the analogy of human-software (inter)actions with audience-drama ones. Of special interest here is her idea to align engagement with Coleridge's dramaturgic concept of *"willing suspension of disbelief"* (p.113). Engagement happens when humans are able to give themselves over to representational action, if they think (and feel) in *"terms of both the content and the conventions of a mimetic context"* (p.115). In particular, neither the offered content nor the supplemented context are responsible for a person's engagement, but the "here-and-now" of the individual and this person's approach (including emotions like motivation) towards the specific software.

Thus the basic driver for engagement with software is a person's **imagination**, i.e. the process of creating inner images (= "imago", Latin) - or building appropriate contexts within our mind (for a discussion see e.g. Rentschler et al. 2003; Röhl 2003; Sesink 2004; Schelhowe 2007). Even though this human ability is often equated to be just fancy, it really is the process of actively re-contextualizing (possibly inner) objects into (possibly inner) contexts. For a representational context this human capability is indispensable and for "New Media" (i.e. a semiotic representational context) it affords a vast potential. If a person is willing to accept the representational context, i.e. to imagine the mimetic context to be valuable, then she is open to engagement. Nevertheless, the need for a user's imagination in taking up creative actions within a digital environment is often underrated by software engineers because it is attributed to the creative potential of the environment. The German media pedagogue W. Sesink (and others like Schelhowe 2007; Lunenfeld 1999) point out that software has to be appropriated by users (2004). The abstraction processes embodied in software (in its models and algorithms) have to be re-instantiated by users in a concretization process in order to become meaningful. This involves the imagination abilities of human beings at its very base and allows humans to approach e.g. the computer as a tool or a medium (e.g. Manovich 2001; Schelhowe 2007).

Metaphors play a central role in activating this imagination process. According to G. Lakoff and M. Johnson "*the locus of metaphor is in concepts not words*" (2003, p.245). We understand and reason about them via multiple (other) metaphors. The phenomenon of such inferential patterns from one conceptual domain to another are called "**conceptual metaphors**". But these conceptual metaphors are not globally valid ones, we as humans use "*personal metaphors to highlight and make coherent our own pasts, our present activities, and our dreams, hopes, and goals as well*" (p.233). We can expect the metaphoric background of children generally to be much less sophisticated than that of adults', moreover we expect their approach towards software to be much less influenced by marketing arguments (i.e. specifications of software designers and marketing professionals). Children appropriate software with experiential flexibility in the underlying metaphors, they reinterpret artifacts to uses which we (as typical adults) hadn't imagined before. Indeed this happened in the PPT study reported below and made us think about children's engagement with this software package originally designed for use in an office suite.

3 PPT Use by Teachers vs. Children

In order to identify one (or more) of the hundred languages of children when approaching software, we observed and analyzed three children dealing with PPT and we did a structural analysis concerned with engagement of teachers and PPT. As we do not aim at general results for children's versus adults' approaches, but are rather interested in finding new ways of engaging interaction design, we only chose a small number of children. Moreover, we use the structural analysis merely for uncovering one typical contrasting conceptual metaphor, to activate most readers personal experience with PPT to build their intuition on. In particular, we do not want to compare the results gained by these distinct methods.

We sort the results according to the following criteria: (1) Conceptual metaphor(s) for PPT, (2) Description of the person's engagement with PPT, and (3) Comprehension of PPT on a meta level.

3.1 Teachers (Expected) Use of PPT

We decided to use the Intel Training Unit VI (4 hours of guided training described on 28 pages with accompanying digital material) titled "Presenting Content with Multimedia" from (Intel & Microsoft 2000). The program "Intel Teach for the Future" is a substantial effort by Intel and Microsoft to "*ensure that technology is used successfully to improve student learning*" by enabling teachers to integrate MS Office products into their classroom activities. Therefore we expected this training unit for PPT to go beyond a mere manual. In particular, Intel's goal was to trigger real classroom action, i.e. engagement of teachers (and only as a consequence then engagement of students), which seemed to fit nicely with our research interest.

(1) In order to understand the conceptual metaphor(s) of PPT which are conveyed to teachers in the training unit, we first looked at the title "*Presenting Content with Multimedia*" as titles typically highlight the underlying concepts. The title sets the stage quite clearly: What a teacher will do with PPT is 'presenting' and the challenge for a teacher is to do it with multimedia, here PPT. Therefore she has to learn how to use the tool right and that is what she is going to learn in the training unit. Then we analyzed the recommended ideas for using PPT in class which point in the same direction. In particular, the *ideas* are listed as: Presentation of projects, presentations of tables and diagrams, show of inquiry results, presentations of interview and research results, presentation of scientific exhibitions, creation of 'living slides', depiction of the School, slide show of excursions, and finally display of statistical data (p.VI-1). With one exception all of these bullets concern presentation, where the various ideas differ in the content of the presentation. PPT is understood as a tool to enable teachers to visualize data in the most general sense. This approach is goal-oriented, i.e. the teacher starts out already knowing how the presentation will look like (more or less) and the PPT tool supports its realization. The exception in the list consists in the "creation of 'living slides'". Even though this mentions creation, it is concerned with the *production* of 'living slides', enabling teachers to produce such, and not the *production process*, engaging teachers to create them.

(2) Now, we want to deduce teachers' engagement with PPT. As already mentioned, the focus of (Intel & Microsoft 2000) is not on using PPT itself, but on suggesting (new classes of) content that can be presented using PPT. Therefore, the only engaging quality subscribed to PPT here is a teacher's empowerment to do it via PPT. This thesis is enforced by the evaluation form, that each teacher is asked to fill out about a short PPT presentation, which was created on the fly beforehand by a partner. The criteria of this evaluation consist of: Order and layout of slides, relevance of content, utilization of graphics, orthography and grammar, and finally terminology, and legibility (p.VI-3). Note that none is concerned with the work or enactment the author did, but with the presentational product as a narrative. Moreover, this implication is supported by the form of the training unit: it reads like a manual (with all negative connotations). That is, it does not explain what can be done with PPT

but which list of clicks is necessary to accomplish a simple task. The idea of expressing oneself – which often is a big attractor – seems far off-hand.

(3) The training unit is modularized into small subtasks like "*adding a new slide*" (p.VI-7). Therefore, we believe that teachers trained this way comprehend PPT on a click-to-click base. The resulting problem is described by Suchman in the difference between plans and situated actions: Actions according to plans do have narrow boundaries and are static. In particular, they do not perceive PPT as an environment in which they visualize and *develop* their ideas.

3.2 Children's Approaches to PPT

In a nutshell, in our experiments with children we observed their behaviour while creating a presentational document with PPT, we analyzed the resulting product, we asked them to describe their comprehension of PPT along several guiding questions, and we asked them for help in writing a manual for their friends explaining how to create one specific slide element that they had used in their own presentation before.

We noted their growing excitement while developing their presentations. In the nearby figure you can see a part of a PPT presentation created by Murtagh (see Figure 1). On the first slide the main element is the ball (left) that "rolls" along a virtual line into the basket of a balloon, which is subsequently attacked by two black panthers (who want to play with the ball). In the second slide an eagle "flies" in and punctures the balloon. The cut-out 2b shows what is hidden under the eagle's feet (2a): a hole through which gas escapes. Finally on the third slide, the balloon "sinks" out of the picture, leaving the ball with slower falling speed behind, so that the ball can go on yet another adventure trip.

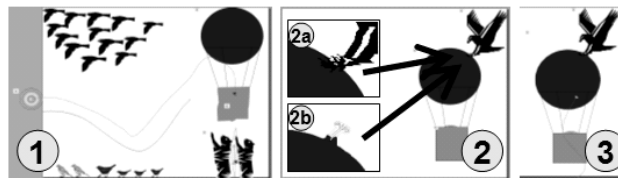


Figure 1: Murtagh's PPT Show "The Ball"

3.2.1 "Murtagh" (10 years, male, moderate PPT knowledge)

(1) The question we asked for the metaphor was "PPT is like ...?" and Murtagh immediately used the "*theatre*" metaphor. In detail, he suggested that the slides are the actors whereas PPT represents the musicians. He considered himself having several roles: the composer, the scriptwriter, the director, and the prop master. The slide show he compared with the play. When the presentation is given, the presenter equals a musician or the speaker. The audience is the audience.

(2) Murtagh liked it best to create a PPT presentation and he considered it to be a little fun to watch others' presentations, but was not eager to watch his own. Observing others when creating presentations was not at all appealing to him.

(3) In order to understand on what level PPT was understood, we wanted him to describe how PPT works. Like the other children he first interpreted the question as "how to program PPT" which he felt insecure about and made the impression of being overstrained. When we altered the question to "How does PPT understand what you want it to do?" we were more successful:

- a. *First, you tell PPT the form you want to use. You can create it or download it from PPT.*
- b. *You indicate the colour for the object. PPT has a lot of colours that you can mix up.*
- c. *You specify along which way the object shall move. You can do this in two ways: with several slides or with Custom Animation. You just indicate the way, which the object shall fly or roll.*
- d. *If you call Custom Animation there pops up a toolbar.*

Then he went on explaining the possibilities hidden behind the icons in the toolbar (whose basic form and colour he remembered and even elaborated on, see Figure 2), e.g. "if you click on the green star with the label 'entrance' then you get the opportunity to add an object onto your slide" or "the red star means 'exit' and lets you disappear objects (if you want)".

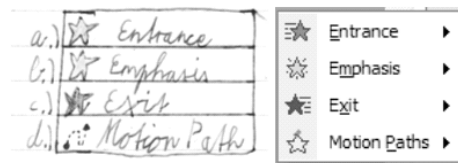


Figure 2: Original and Murtagh's recall of PPT's Custom Animation Toolbar

We weren't sure whether a manual-like style of explanation wouldn't creep up with a theatre metaphor as well, so we explicitly asked Murtagh to please give a description how he would explain creating one of his favourite scenes ("The Flight of the Eagle") to a friend of his age or younger. He took the request literally and generated an interview between "Doctor Murtagh" and "Child". Even though a click list follows, it is a cause and effect list like "if you click here, then a toolbar opens and you can do that". Moreover, it is striking that a general description almost always is followed by a special instance of the subtask with relation to the eagle and his flight. For instance, once the toolbar is opened Doctor Murtagh explains "Entry stands for entrance (you can let things appear). I let the eagle fly into the slide from the upper-right corner." He also doesn't show any respect for PPT: if other software is more suited to his needs, e.g. whenever he wants to paint, he uses "Paint". These images are put together in a bricolage style, always having in mind what the end-effect will be in the play at the end.

3.2.2 "Rand" (12 years, male, general PPT knowledge)

(1) Rand's intuitive analogy for PPT was that of an "archive". The file records are represented by the objects like circles or textboxes which PPT offers. The user is the person look-

ing for files, PPT the archivist. With mouse clicks he can communicate with the archivist, i.e. *"mouse clicks are the words"*. The presentational document he compared to information (assembled from the records) that is ready to be shown to someone else.

(2) His engagement was obvious, the show afterwards seemed very important for him. In the figure below you can see a PPT presentation by Rand which consists of *one* slide (with lots of custom animations on the right hand side) and which explains thereby his looking forward to the overall experience of the show. As shown, you really don't know what show will unfold by simply looking at the slide in developer mode. In presentation mode, a car race is being announced by a "3-2-1-Go" sequence, the race proceeds in a surprising manner, the winner is nominated, and the race show is properly finished.



Figure 3: Rand's PPT Show "The Race"

(3) Rand described the "functioning" of PPT with *"clicking on certain places in order to create an image which you have in mind"*. The content in his slide shows consisted persistently in actions. He even elaborated on the representational level: *"PPT only needs to know what I order it to do, e.g. it doesn't have to know whether a square together with a triangle is a house, it only needs to know that it has to show a square and a triangle."*

3.2.3 "Orlana" (14 years, female, general PPT knowledge)

(1) When she was asked for a good metaphor for PPT, Orlana decided to go for the "movie crew" metaphor. The user is the director, every PPT function a member of the crew which receives assignments by the director *"so that at the end the perfect presentation (the movie) evolves"*. She repeatedly pointed out, that - although the director has the power and the ideas - without her crew she couldn't express them adequately. Orlana put her "movie crew" metaphor to work in a presentation about the crusades in a history class. The image of the knight moves along the map, stopping at certain locations to let her elaborate on them in the given talk.

(2) She describes the pres. document as art form that needs to be designed and which enables her to *"bundle her knowledge"*. She thinks of the development process as fun.

(3) First, Orlana actually was too impatient with the description of "how to program PPT". Then she explains, PPT is used as a medium for transforming her own ideas into a slide show, that serves as *"background"* for her talk.

3.2.4 Discussion

We found very differing underlying metaphors for agency in the interaction design. The Intel Training unit suggested to use PPT as a (slave) tool, that doesn't contribute to the outcome by itself, whereas the children in our study assigned the PPT-software the role of 'musicians' (Murtagh himself being the composer) with a theatre background metaphor, the role of 'archivist' (with whom Rand communicated via mouse clicks), and the role of 'crew members' (whose autonomous actions are crucial for Orlana's expression of ideas). In particular, PPT is assigned agency by itself, the slides e.g. are not considered as products but as 'actors' by Murtagh! A. Blackwell urgently points to the fact that metaphors are used in the design process *and* in the use process and that they can differ dramatically. If one posits PPT into an office setting, then it stands to reason that the use metaphor will have a tool-like quality, whereas if one posits PPT into a drama setting, the use metaphor has a mediator quality.

For the Intel Training Unit, the creation of the presentational document seemed to be the most important endeavour, but not the creation *process*. The presentation had a product-quality, in that it was assumed to be "ready-to-mind" before even starting to use the PPT software. We might call it goal-oriented instead of process-oriented. This has an interesting consequence: the Intel Training showcases "how" things can be done within PPT, but not "what" can be done. This originates in the understanding of PPT as a tool to produce a document. In contrast, the children in our study understood PPT as a tool to *develop* a presentational document. They only started out with a general scheme. The presentational document *evolved* and often surprised the PPT author herself afterwards.

Barr et al. (2005) analyze user interface metaphors for the MS Office Project Gallery. Interestingly, they state that "[a]lmost all of the metaphors discovered in the Project Gallery had a physical nature" (p.115), e.g. the "gallery" or the "toolbox" metaphor. They explain, that because of the difficulty of using process-oriented metaphors (like "selecting" or "working") in design practice, the MS designers chose physical ones with associated processes. We argue that this is (often) different in PPT, e.g. if you look at the time-line order (in the use process) of menu points in Murtagh's representation of the Custom Animations menu.

4 Conclusion

The motivation for this paper is based in our interest for the qualities of engagement in interaction design. In order to elicit this, we wanted to make use of Malaguzzi's notion of "Hundred Languages of Children" (1998) for appropriating e.g. software. First, we took a close look at both of engagement's defining properties: the state of being engaged *and* the act of engaging. New Media provide the representational context for the "state of being engaged" as they are processing media that aren't "*finished*" (Lunenfeld 1999, p.7). But the abstract model implemented in the software has to be actualised by the user. We argued that this actualization is an imagination process and governed by conceptual metaphors for interactivity. With our analysis of the underlying conceptual metaphors for use of MS PowerPoint by teacher trainers and children, we verified qualitatively different approaches and distinct en-

agement. The refreshing approach by these children and their use of underlying metaphors towards good old PPT has several consequences.

First, it hints at interaction designers' responsibility for *enabling* engaging use metaphors. It seems probable that PPT did so because of the development process towards a theatre-like presentation at the end. Therefore on the one hand, PPT interaction design stresses the process character, we might call it "*process-oriented*". In particular, we observed the PPT 'attitude' of supporting *useflow* instead of *workflow*, e.g. by naming a custom animation menu point "Entry" instead of "Show Object". On the other hand, placing a theatre-like element at the end of a development process might naturally induce the user's uptake of a theatre-like metaphor. From our structural analysis, we also conclude, that marketing departments shouldn't intervene or at least not narrow down the potential of possible use metaphors.

Secondly, users have to *learn* to use engaging use metaphors. This requirement extends the usual demand for media competency in that engagement is not (only) the consequence but also a precondition of interaction. In particular, the responsibility for engagement is not just the software's but the user's one as well. The relevance of the "act of engaging" points to the role of *agency* that has to be awarded to both partners of the interaction. In particular, interaction designers should set the interaction frame in such a way that *mutual* partnership can evolve, see e.g. (Kohlhase 2006a). Rather unexpectedly, PPT sets a good example e.g. by offering slide masters and the right to overwrite them.

Thirdly, we like to stress the ever present risk of underestimation of users. Our subjects clearly used conceptual principles and mental models when using PPT, e.g. Rand's interpretation of "mouse clicks as words" vs. Intel's "click-by-click" teaching method. Interaction designers should make use of it, e.g. by designing their products with appropriate use metaphors in mind.

So, what can the hundred languages of children teach us? Designers (and hence software) have to exploit users as human beings and users have to learn to use their hundred languages as well.

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