

## A study about usability criteria on computer interfaces for children

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This study's main goal is to produce a set of guidelines intended to aid a programmer who wishes to build a computer application targeted at children ranging from 5 to 7 years old. The guidelines are going to be tested within a selected group of test-interfaces purposefully built for the study and the test-subjects will be children in the appropriate age-groups.

This study intends to represent a novel approach to the development user interfaces for children. The ideas behind the guidelines come from psychology, particularly cognitivism, instead of the usual empirical methods. Although empirical design guidelines are widely available, they usually have no theoretical basis.

The theoretical basis required comes from the work of Jean Piaget. In his work Piaget decomposed the child's development in 4 stages: sensory-motor (birth to 2 years), preoperational (2 to 6/7 years), concrete operational (7 to 12 years) and formal operations (12 years on). The features of children's thoughts can be summarised in a set of characteristics and these are modelled into questions that can be answered by giving the interfaces for children to try out.

The features embraced in the study are: egocentrism, transduction, centration and static representation, problems with conservation, juxtaposition and syncretism, problems operating classes and relations. After considering these features and the impact on the way the child will perceive any given interface, the following questions were extracted:

1. Are children able to recognize an image link in the interface, or are links that mix image and text more efficient?

Interfaces tend to link ideas to images or symbols. We'll try to discover if children understand this association the same way as adults. If they can't, it can be attributable to egocentrism (difficulty in understanding what the interface's developer was thinking) or transduction (incorrect association between ideas and images).

2. Are children capable of using the keyboard correctly and efficiently?

All keyboard keys are upper-case. If children are centered on the form of the character on the keyboard, they may not associate it to the lower-case characters (centration). On the other hand, they may have trouble understanding that the same key can perform different actions.

3. If the application is a learning tool, should the controls in multiple windows be located randomly or should they allow the user to learn a sequence of events?

In a learning tool, the emphasis should be on the acquisition of some kind of knowledge, rather than the manipulation of the interface itself. Relations between controls must be carefully planned, so that children will not be able to use some kind of transductive thought to discover unintended relationships.

4. Are children able to associate images at the interface with the actions initiated by them?

If an image starts a set of actions, can the user understand all the actions involved? Children must be able to detect the relation between different actions (syncretism) and classify them in groups and subgroups.

5. Can children recognize the necessity to undo some actions in order to perform a goal?

Children may have trouble understanding the "undo" actions (static representation and centration).

6. Can children repeat successful actions within the interface?

Same as the question above. To develop this skill, children must "de-center" their thought and understand the interface's point of view.

7. Are children capable of solving a problem that requires several independent steps?

To do so, they need to overcome conservation and syncretism problems, and to relate the steps in the right order.

8. Which is better: a help link, or explicit help printed on the interface?

Again, children must take into account the interface's needs and not their own, to understand whether help is necessary.

9. Is there a limit to the number of interactive controls on an interface?

Children must overcome egocentrism to perceive the needs of the application and to understand that some controls have nothing to do with the goal they are seeking.

10. Will children understand an interface divided in categories?

Only if they can classify and order the actions.

Right now the test-interfaces intended to address these questions are being developed. When they are finished, a number of subjects will be gathered to perform the tests.

*An extended version of the paper is available, by request, from the authors. The material in this handout can be quoted.*