RELATED WORK

- **Designing successful CS lessons and courses:** CS phenomena, clarifying science content, and investigating students' perspectives [1]

- **Game designing** is a well-known CS teaching approach that promises an appropriate context for teaching introductory programming [2] [3]

- **Numerous studies** on novice programmers investigated, partially contradictory, (mis-)conceptions of OOP [4]

- **No research** on OOP conceptions of novice programmers in the context of digital games was found
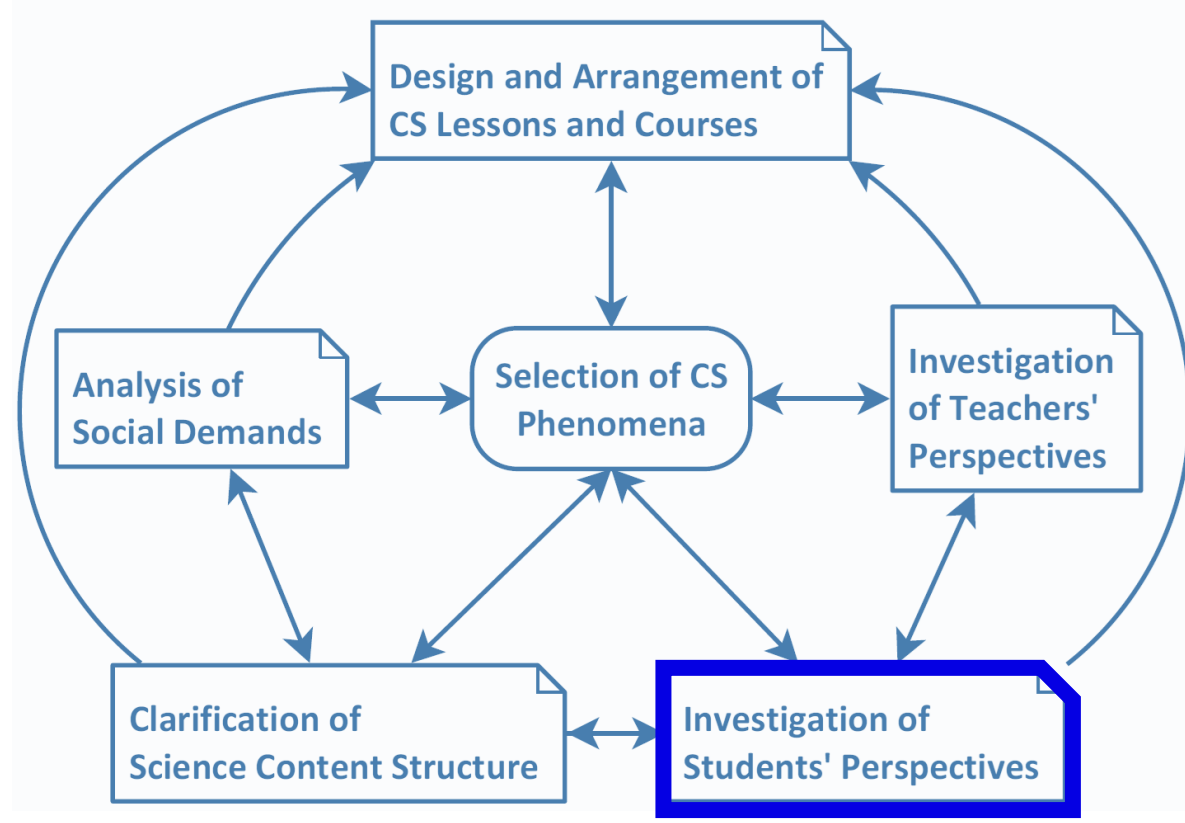

Figure 1. Educational Reconstruction for Computer Science Education. [1]

¿ RESEARCH QUESTIONS ?

Which conceptions do students develop in different phases of introductory programming when learning object-oriented programming (OOP) in the context of game designing?

- Which programming-related conceptions do learners develop about digital games and their functions and about (relevant) object-oriented concepts?

- How do the materials/ programming environments/ teacher instructions influence students' conceptions of OOP?

- How do previous knowledge of programming/algorithms influence students' conceptions of OOP?

METHODOLOGY

- **Method:** Explorative qualitative research

- **Approach:** Long- term study by surveying several students at specific dates during the introductory class

- **Instruments:** Semi-structured interviews and open-ended questionnaires to investigate students' developed conceptions

- **Evaluation:** Qualitative analysis by using the method of Kuckartz [5]

| Pilot study	Main study
At a university to evaluate the developed instruments	Introductory CS classes in secondary schools to investigate students' developed conceptions of OOP during the first teaching year

PILOT STUDY

Introductory Object-Oriented Programming 1

SEMESTER

4 👥 + 26 👥

Data Collection #1 ✓

Observations + Analysis ✓

Data Collection #2

STUDENTS' CONCEPTIONS OF OBJECT-ORIENTED PROGRAMMING IN THE CONTEXT OF GAME DESIGNING IN COMPUTING EDUCATION

Design of a Ph.D. Research Project to Explore Students' Conceptions in a Long-Term Study

FIRST RESULTS
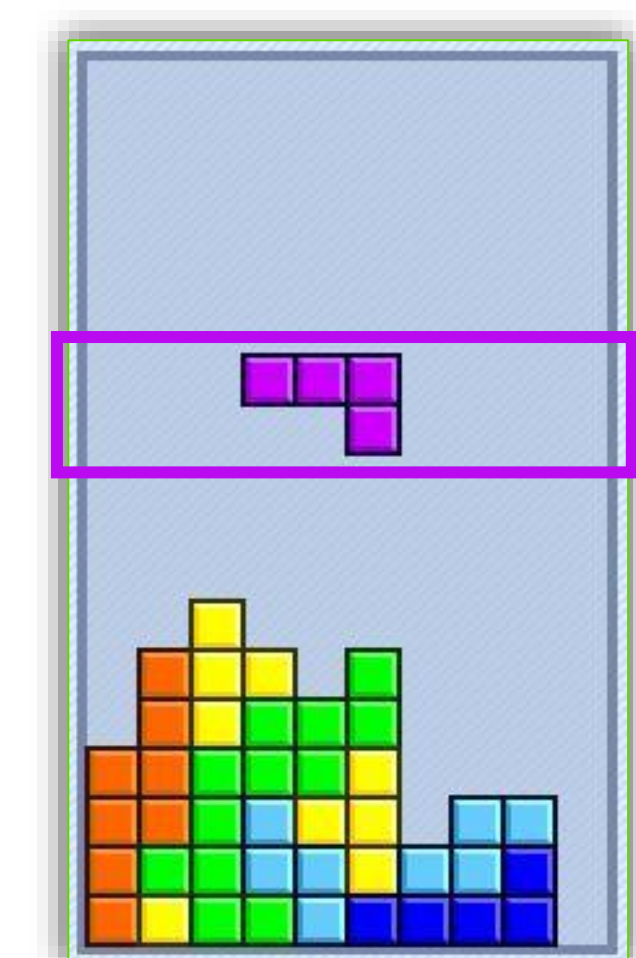
First, the computer needs to record the shape [of the brick]: How are the pixels placed? And then the computer needs to move all the pixels on the y-axis one value down. While doing that it has to check if the pixel under it is free or if it is already assigned with another pixel, because then the brick cannot move down.*
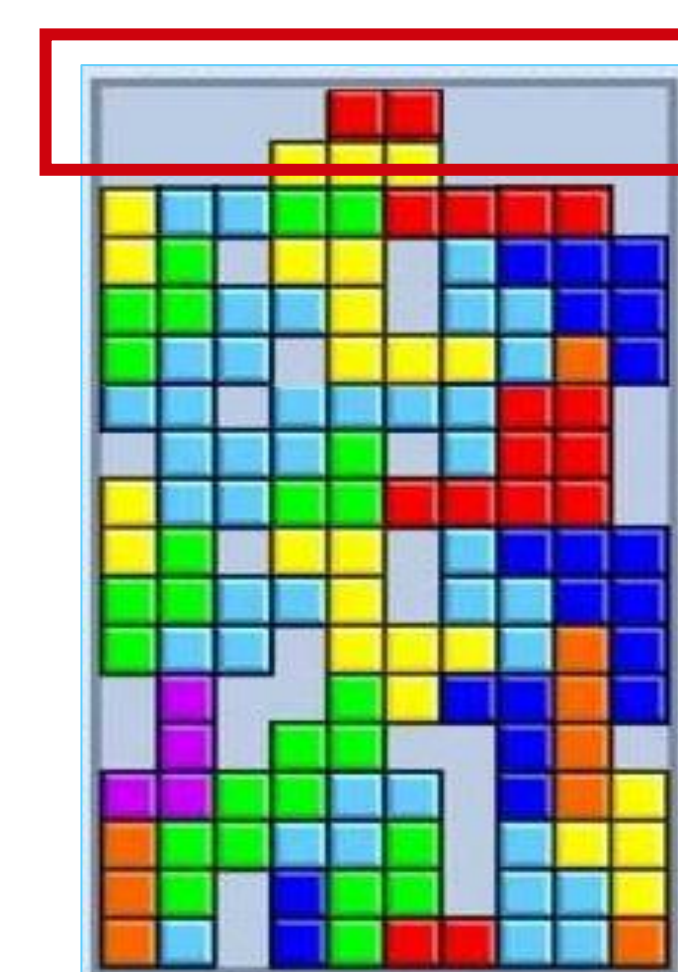
.The computer should know, first this field is 10x10 and if a shape, and the computer knows the shapes, for example, the square goes over two parts and if then the square stops in the tenth line, but then the computer recognizes there are still elements in the eleventh line, then the computer will know "Ah, that doesn't work. It's over the margin." And then it would realize that this is not possible.*

How would you program this game?
What is happening in the background?
Which information is needed?
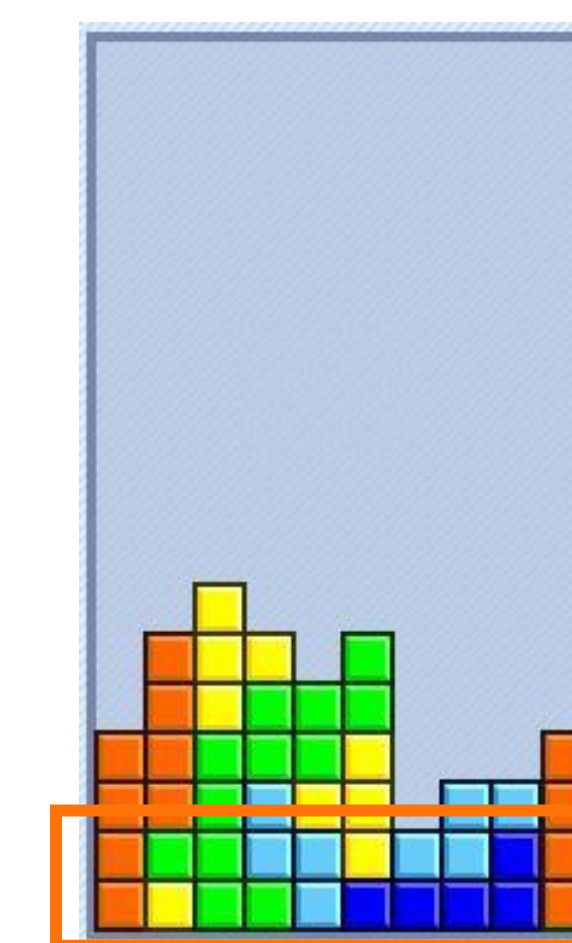
The program needs to know: If the row is complete, it has to be eliminated. But it is important that not every brick from the row will be eliminated entirely, just the row which is complete. That means if there are uncompleted rows [next to the completed one] they have to move down without staying „in the air". Otherwise there would be isolated bricks which cannot be used while playing. It woud be difficult to move new bricks while isolated bricks which are not needed are all over the field.*

*Loosely translated from German.

UDE

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