

# Sprachsensibel im vorschulischen Bereich und der Primarstufe unterrichten

## 1-2: Principles of Knowledge Construction and Teaching

Regionale Fortbildung Washington, D.C., 28.02.-02.03.2019

**Prof. Dr. Kristin Kersten**  
English Department  
Hildesheim University  
*kristin.kersten@uni-hildesheim.de*





# Sprache

- Die Materialien werden zum größten Teil auf Englisch ...
  - ... und manchmal bilingual sein
- **Welche Sprache bevorzugen Sie im Workshop?**



# Einstieg

- Was begeistert Sie am meisten an Ihrer Schule?
- Was sind die größten "Baustellen", mit denen Sie umgehen müssen?
- Was sind die wichtigsten Fragen, die Sie im Moment beschäftigen?





# Fragen

➤ Was sind die wichtigsten Fragen, die Sie im Moment beschäftigen?

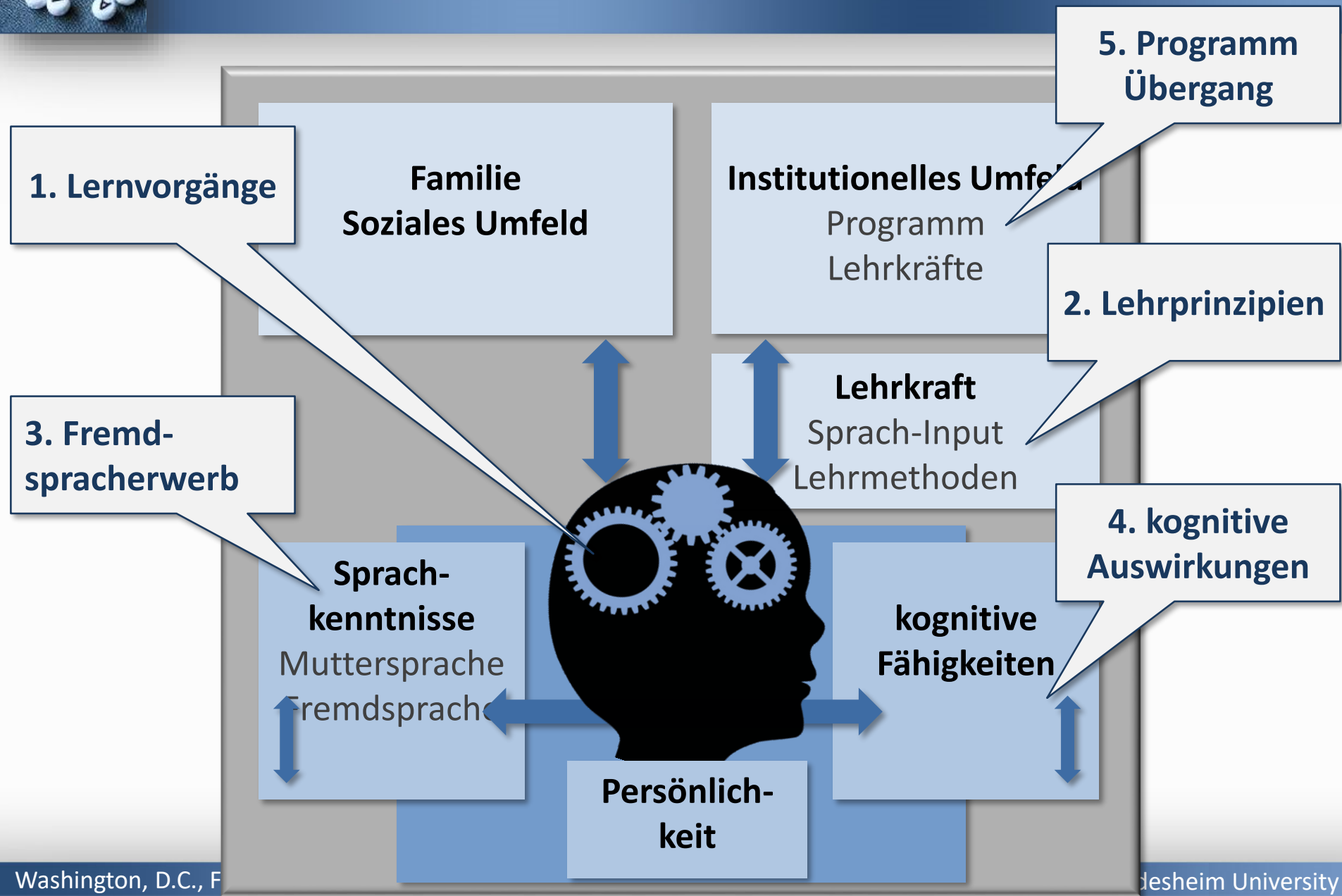
⇒ Fragen auf Postern sammeln

⇒ uns im Laufe des Workshops darüber austauschen

⇒ am Ende des Workshops darauf beziehen



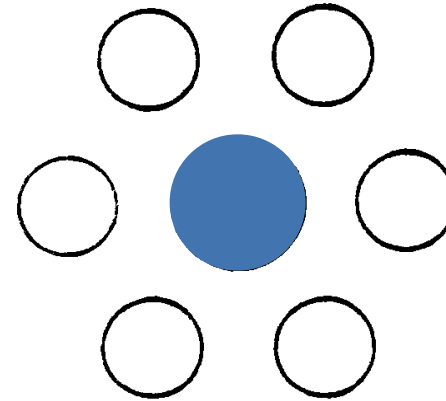
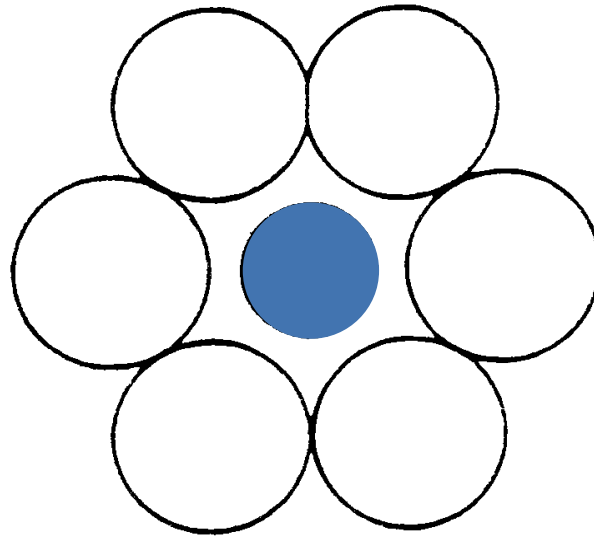
# Programm



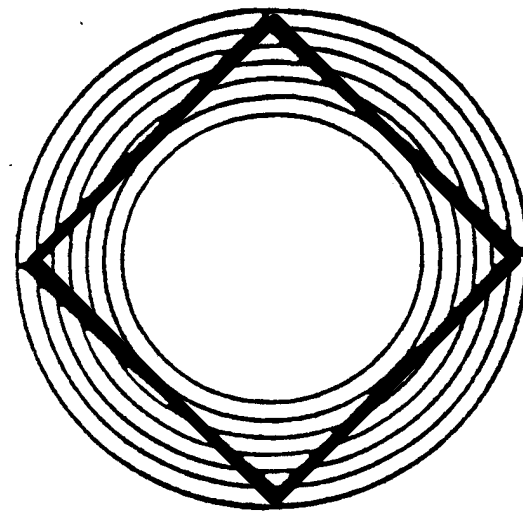
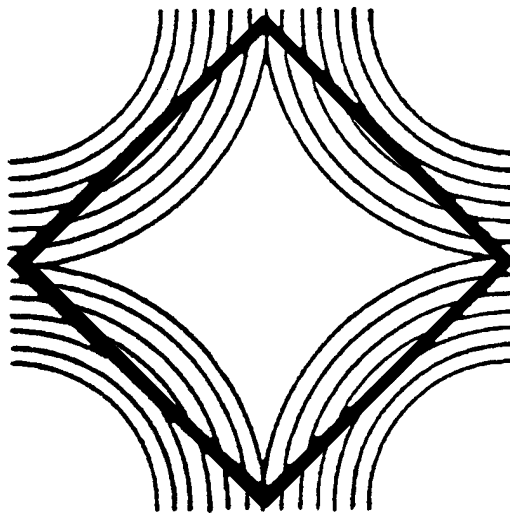
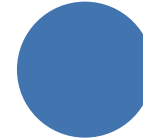
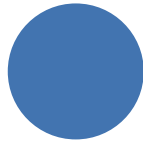


# Sessions 1 and 2

## **Principles of Knowledge Construction and (Language) Teaching**

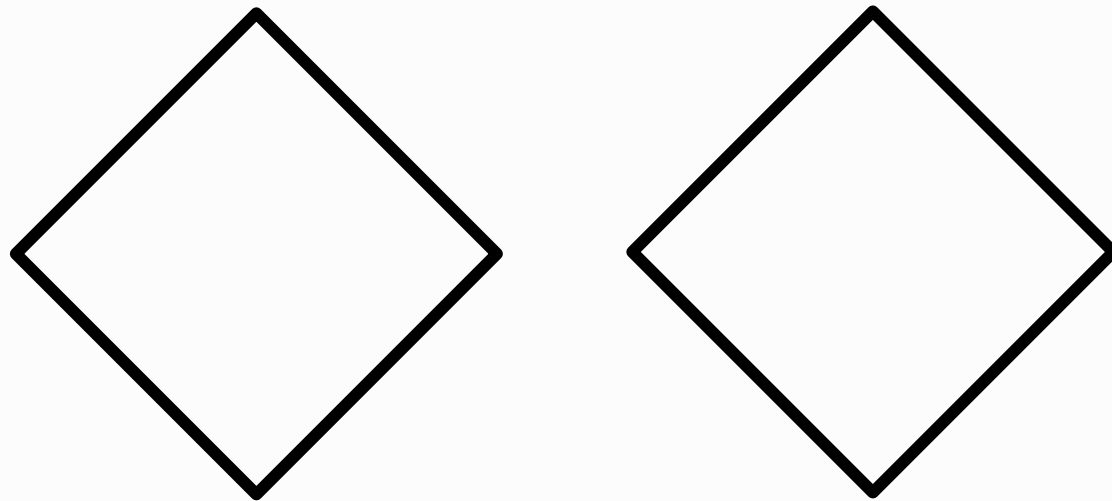


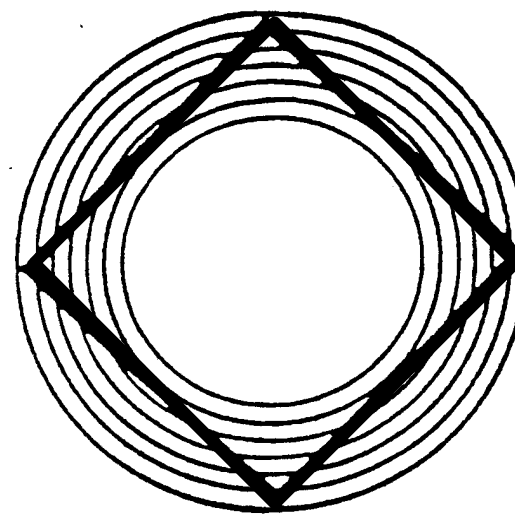
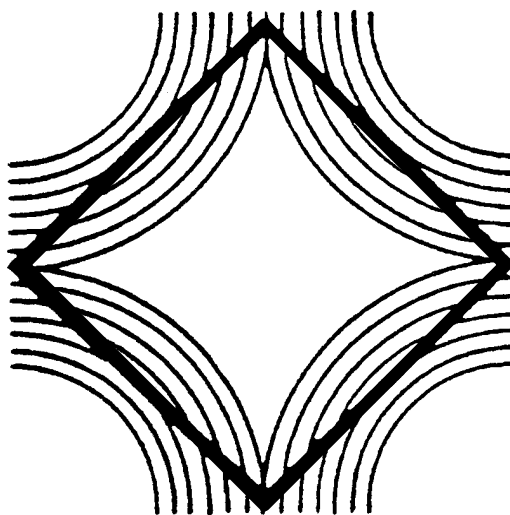
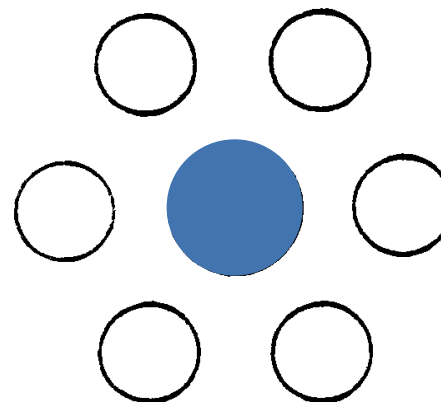
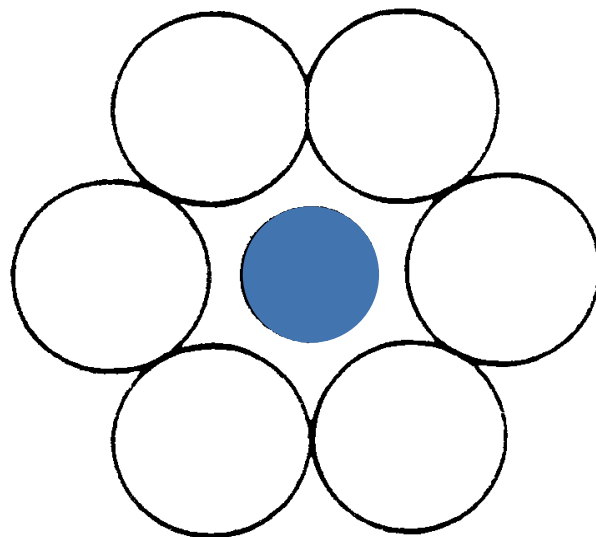
Which of the two blue circles looks bigger?

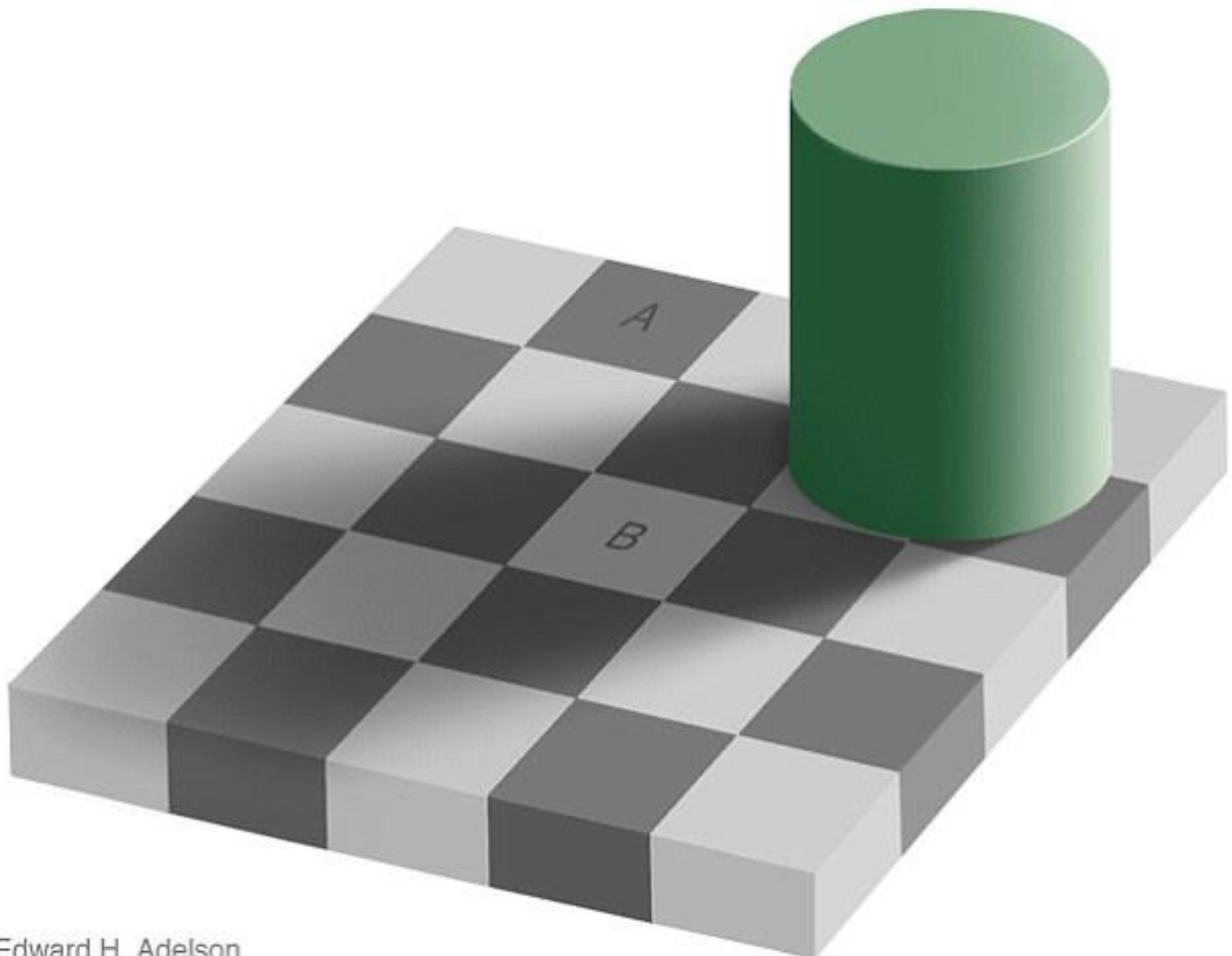


What do the two squares look like?





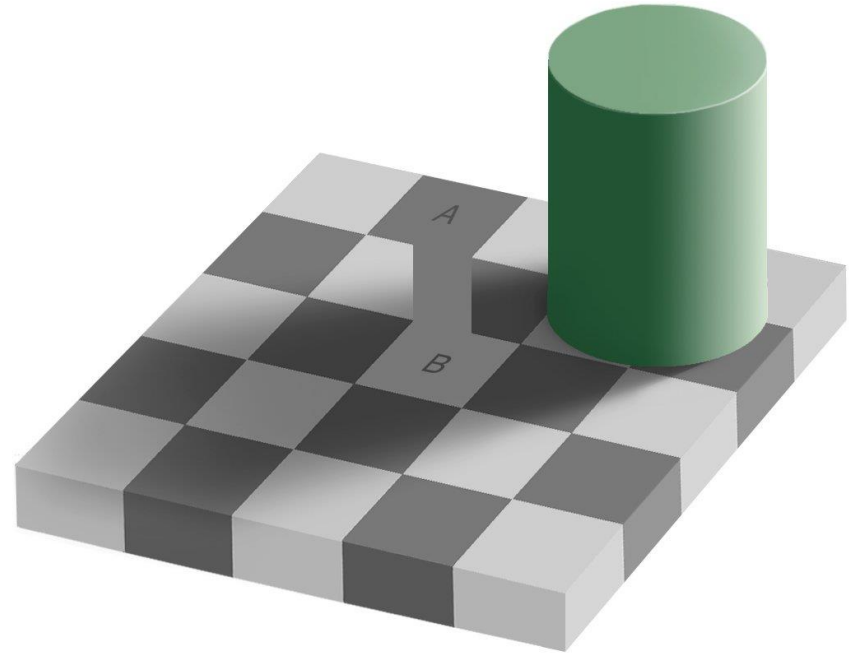
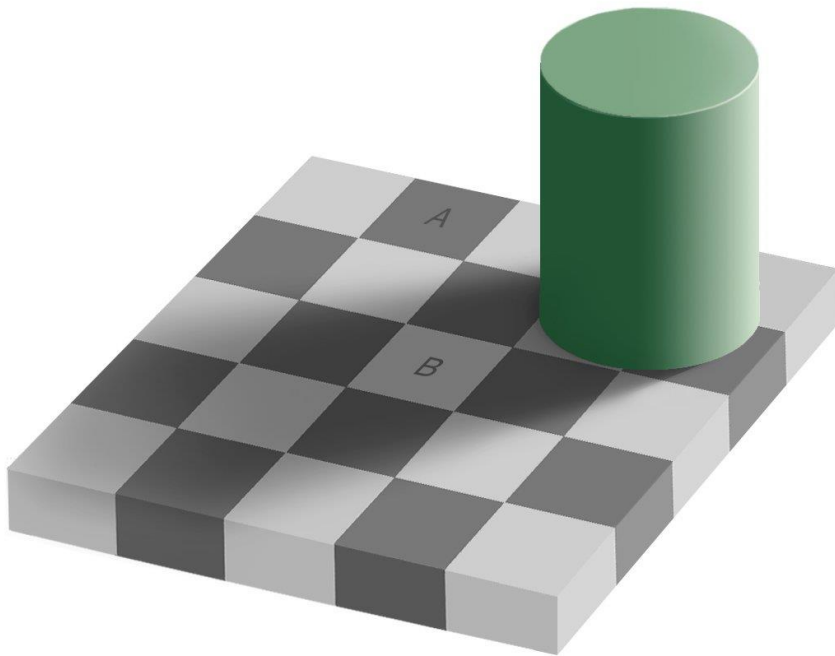




Edward H. Adelson

What colors do the squares marked A and B have?

Although it may seem impossible to believe, the squares marked 'A' and 'B' are actually exactly the same shade of grey.





# Who dunnit?

## Videos

Whodunnit:

- <https://www.youtube.com/watch?v=ubNF9QNEQLA>

Card trick:

- <https://www.youtube.com/watch?v=v3iPrBrGSJM>

Basketball:

- <https://www.youtube.com/watch?v=Ahg6qcgoay4>

# What is the color of this dress?



[http://www.focus.de/digital/videos/studie-an-der-uni-bochum-wenn-sie-dieses-kleid-weiss-gold-sehen-ist-ihr-hirn-gerade-aussergewoehnlich-aktiv\\_id\\_5110749.html](http://www.focus.de/digital/videos/studie-an-der-uni-bochum-wenn-sie-dieses-kleid-weiss-gold-sehen-ist-ihr-hirn-gerade-aussergewoehnlich-aktiv_id_5110749.html)



# Construction of Knowledge





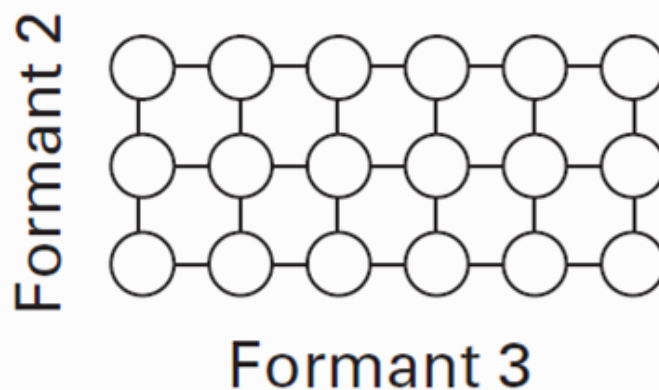


# Speech Perception: "*Magnet Effect*"

**Computer-created speech sounds: Regular acoustic distance**

**/ra/ – /la/**

Physical stimuli



From: Kuhl (1999: 107)

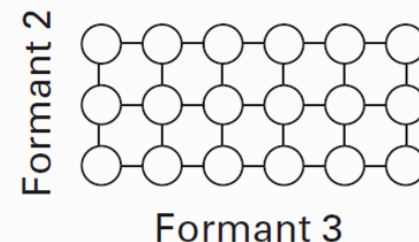




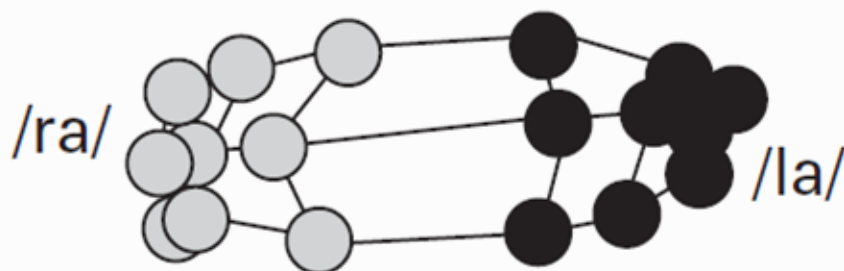
# Speech Perception: "*Magnet Effect*"

## Perception of American and Japanese speakers:

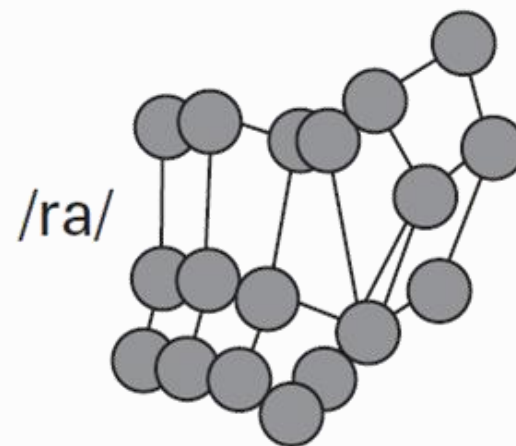
Physical stimuli



Perception: Americans

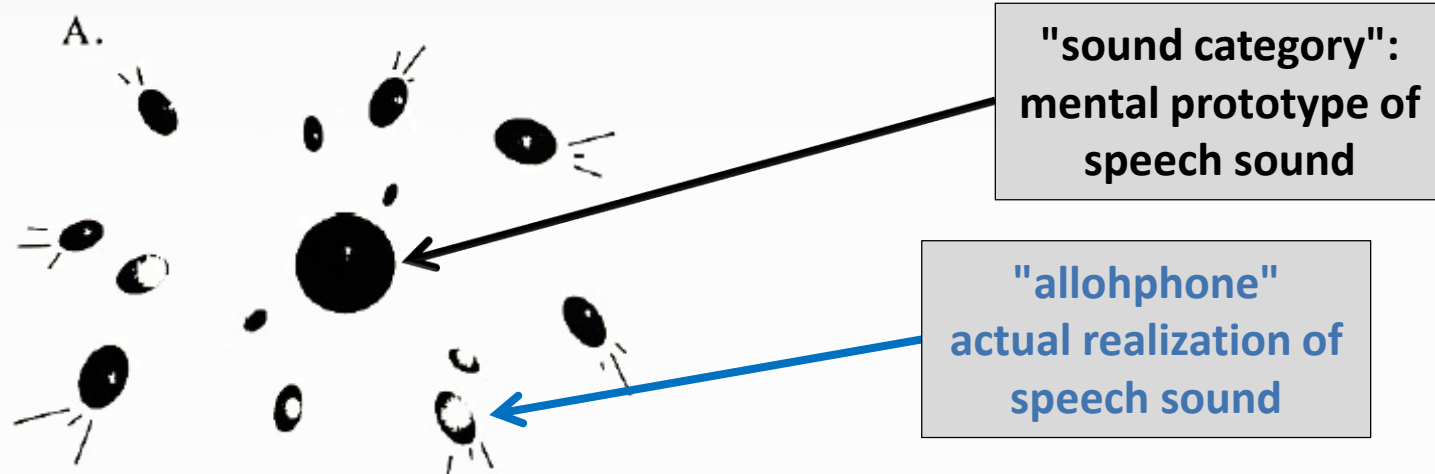


Perception: Japanese

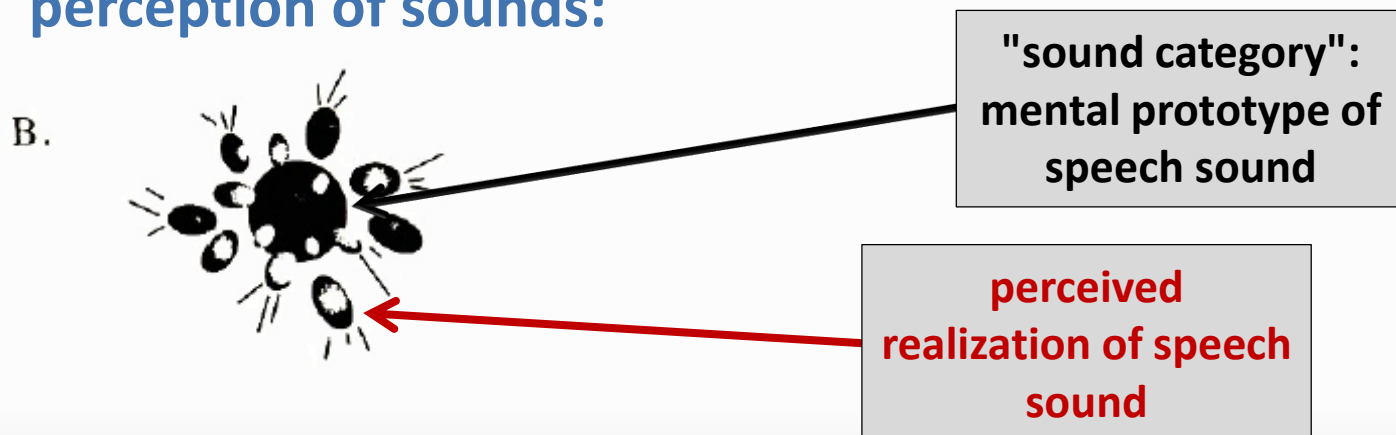




# Speech Perception: *Magnet Effect*



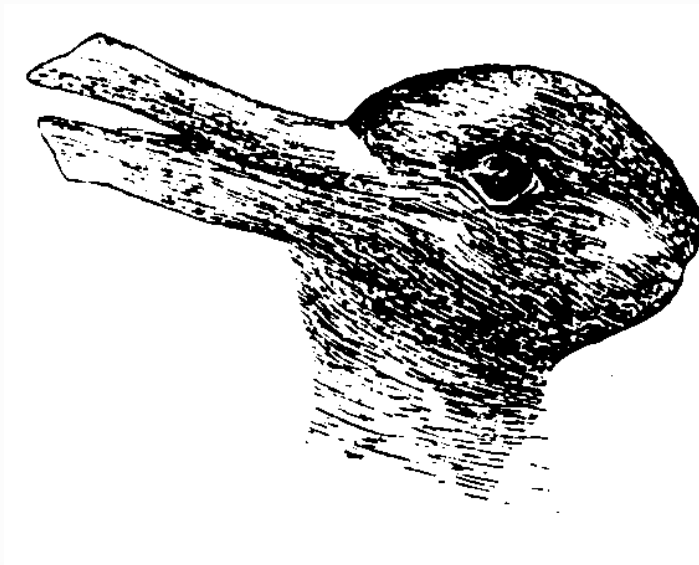
perception of sounds:



From: Kuhl & Iverson (1995:124)

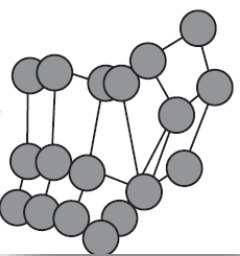
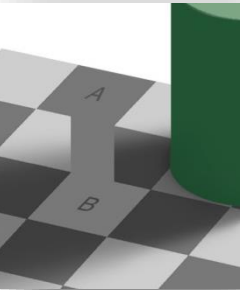


# Construction of Knowledge



(von Foerster 1981)

# Think – Pair – Share



1. What did all of the examples have in common?

2. What hypothesis, general principle or assumption can we derive from this?







# Construction of Knowledge



Antoine de  
Saint-Exupéry:

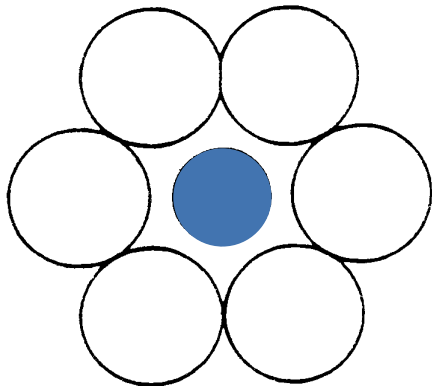




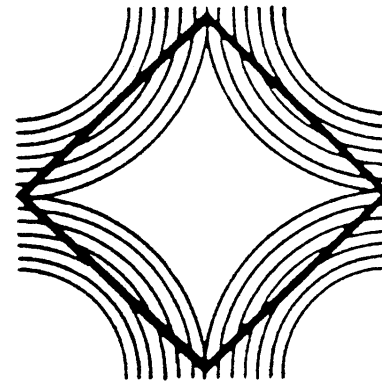
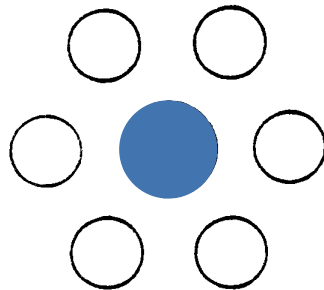
# Construction of Knowledge

- **Constructivism:** human knowledge and perception are shaped and determined by our sensory apparatus
- The brain "receives" information from the senses and actively interprets / derives meaning from it

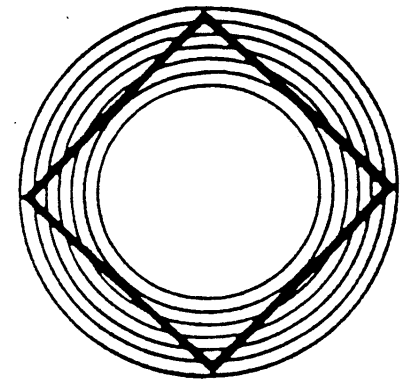
⇒ what we PERCEIVE is what we GET!



Circles in the middle are identical



Lines are straight

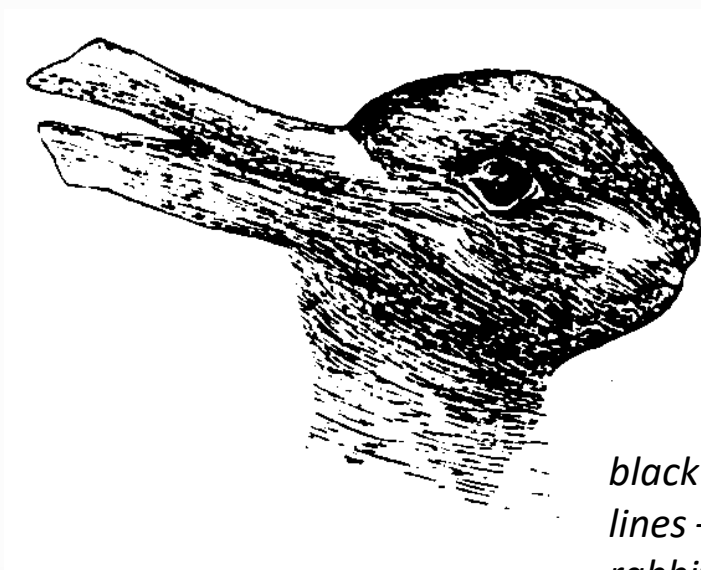




# Construction of Knowledge

The human brain ...

- ... seeks to structure the input it gets from the senses, and to apply meaning to it



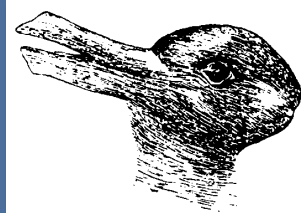
*black and white dots and lines – meaning (duck/rabbit) is actively applied*



(von Foerster 1981)



# Construction of Knowledge



## The human brain ...

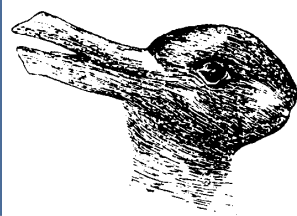
- ... seeks to structure the input it gets from the senses, and to apply meaning to it
- ... has selective attention (e.g.: "cocktail-party effect")





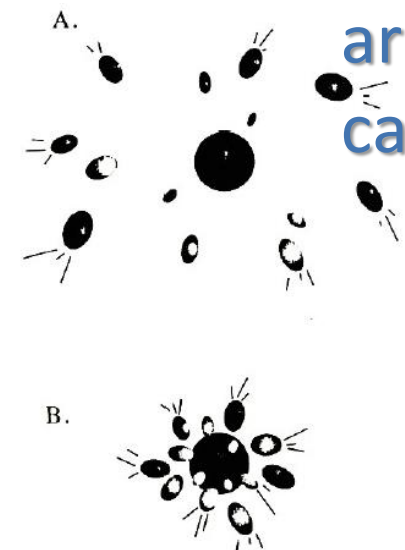


# Construction of Knowledge



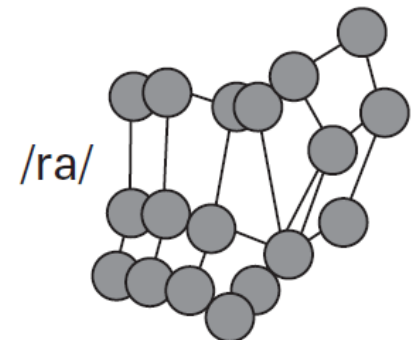
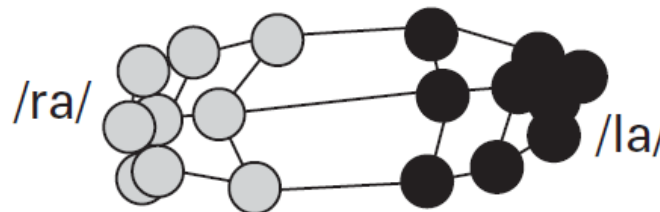
## The human brain ...

- ... seeks to structure the input it gets from the senses, and to apply meaning to it
- ... has selective attention: "cocktail-party effect"
- ... categorizes incoming information according to our prior world knowledge: ⇒ small differences are not perceived but classified as the same category



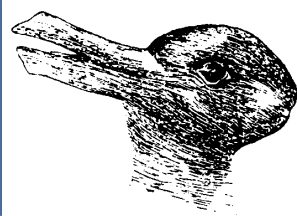
Perception: Americans

Perception: Japanese





# Construction of Knowledge



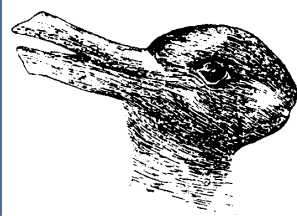
Our human perception ...

- ... is dependent on the activity and configuration of our brain



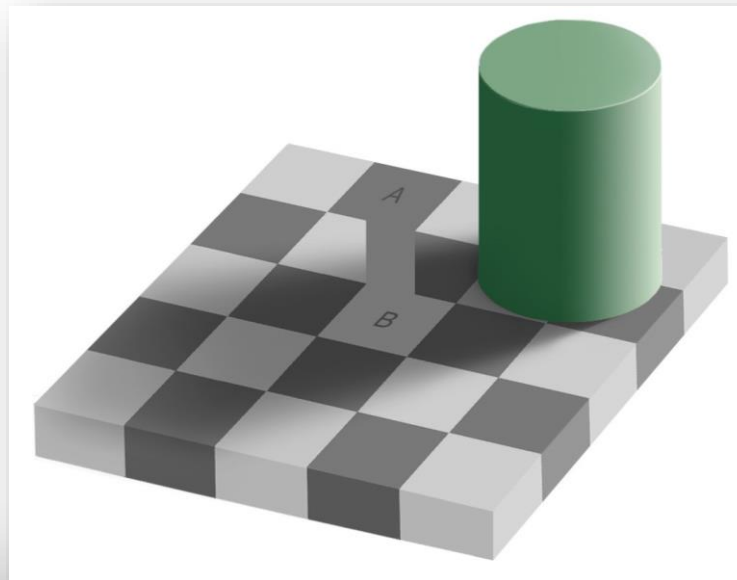


# Construction of Knowledge



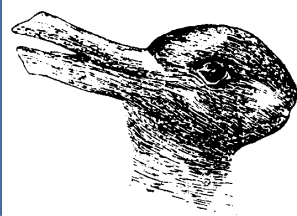
Our human perception ...

- ... is dependent on our prior knowledge of the world ("Weltwissen", "Lebenswelt")





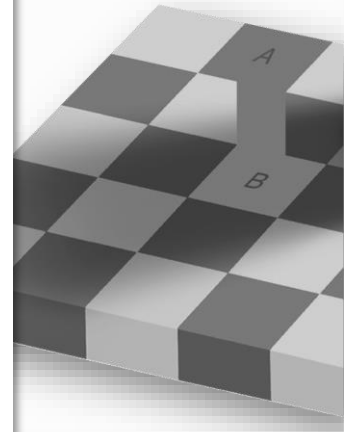
# Construction of Knowledge



## Our human perception ...

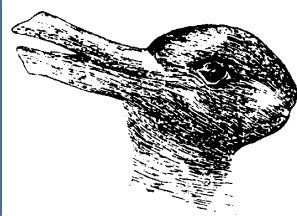
- ... is dependent on our prior knowledge of the world ("Weltwissen", "Lebenswelt")

Your eyes and brain are constantly trying to figure out the colour of the objects around you, and in doing so automatically compensate for shadows. The square marked 'B' is in the shadow cast by the green cylinder, while the square marked 'A' is outside of the shadow. Your eyes and brain see that the two squares are the same shade of grey, but then think, 'Hold on - if a square in a shadow reflects the same amount of light as a square outside of the shadow, then in reality it must be a much lighter shade of grey.' As a result, your brain alters your perception of the image so that you see what it thinks is out there in the real world."





# Construction of Knowledge



Our perception leads to the phenomenon....

⇒ ... that the brain  
actively *constructs*  
meaning

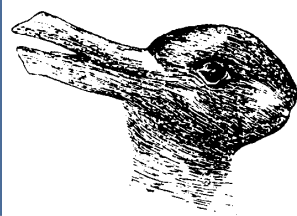


[http://www.ucl.ac.uk/news/news-articles/Active\\_brain.JPG](http://www.ucl.ac.uk/news/news-articles/Active_brain.JPG)





# Construction of Knowledge: Summary



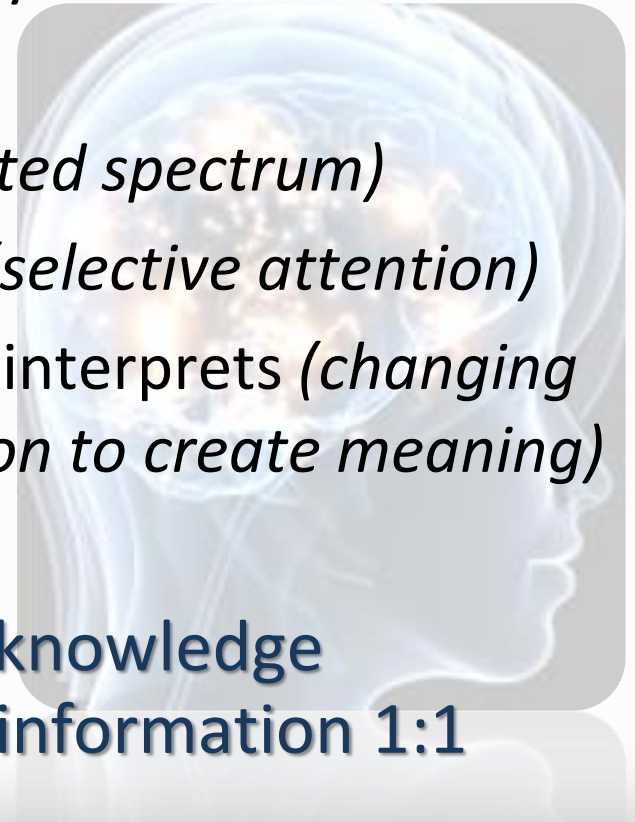
Senses and perception: The Brain “constructs” meaning

⇒ "We do not perceive the "reality" of the world.

**We perceive:**

- what our senses can grasp (*limited spectrum*)
- what our attention focuses on (*selective attention*)
- what our brain categorizes and interprets (*changing or "warping" sensory information to create meaning*)

⇒ The brain *actively constructs* knowledge instead of "being filled" with information 1:1





# Brainstorming

THINK



What does this mean...

... for the process  
of *learning*?

⇒ for the teacher?

⇒ for the learner?

⇒ for the group activities?





# Learning = Knowledge Construction

Learning is seen as a process ...

- ... to adapt internal concepts of the world ...
- ... to new insights, and thus ...
- ... to reach a new or extended idea of reality





# Constructivism



The theory of constructivism postulates that ...

1. ... our mental system cannot be "taught" anything
2. ... it can just be "perturbed", or brought into a "disequilibrium"

⇒ Piaget used this idea to explain the process of learning:

⇒ *"assimilation", "equilibrium"*

⇒ *"accomodation", "disequilibrium"*



# Mental Reorganization

"Current mental structure in long-term memory"

"hand"  
equilibrium

assimilation





# Mental Reorganization

"Poor match: Disequilibrium results"

"???"  
disequilibrium

accomodation

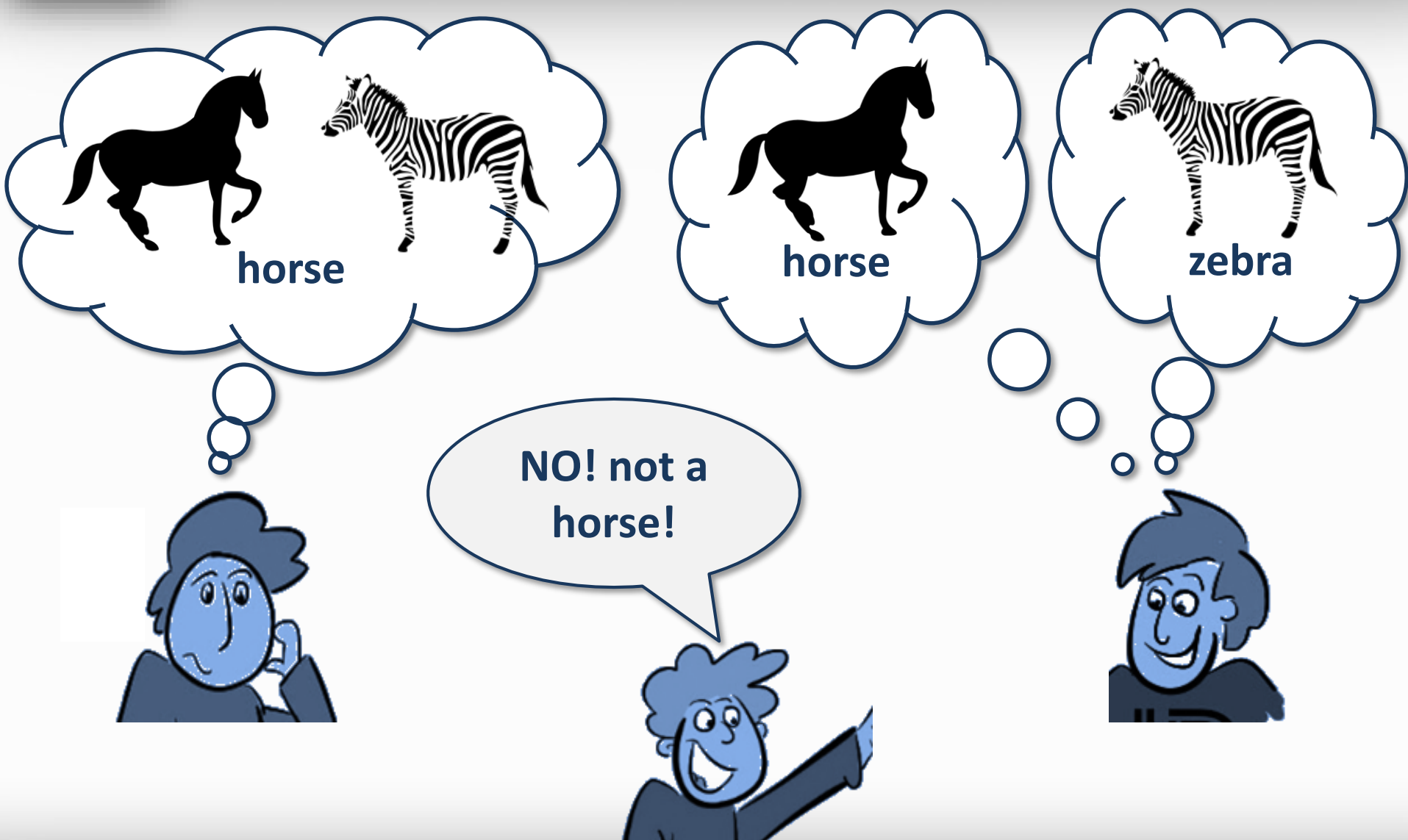


*"Essentially, all models are false, but some are useful."*

(George Box)

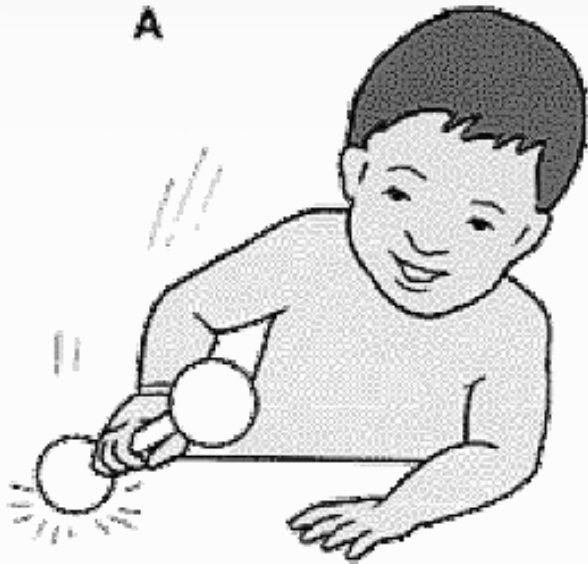


equilibrium / assimilation  $\Rightarrow$  *perturbation*  
disequilibrium / accomodation  $\Rightarrow$  *learning*

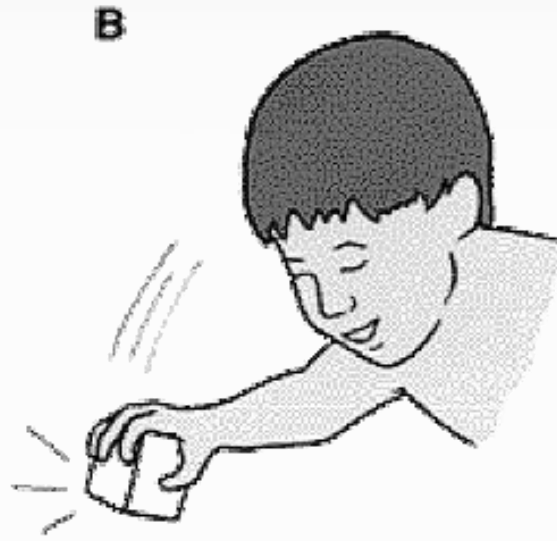




equilibrium / assimilation  $\Rightarrow$  *perturbation*  
disequilibrium / accomodation  $\Rightarrow$  *learning*



Banging is a favorite **scheme** used by babies to explore their world . . .



. . And **assimilation** occurs when they incorporate new objects into the scheme.



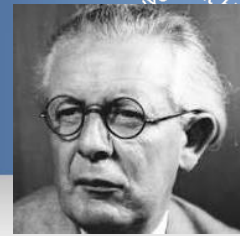
**Accomodation** occurs when the new object doesn't fit the existing scheme.

<https://www.enkivillage.org/assimilation.html>

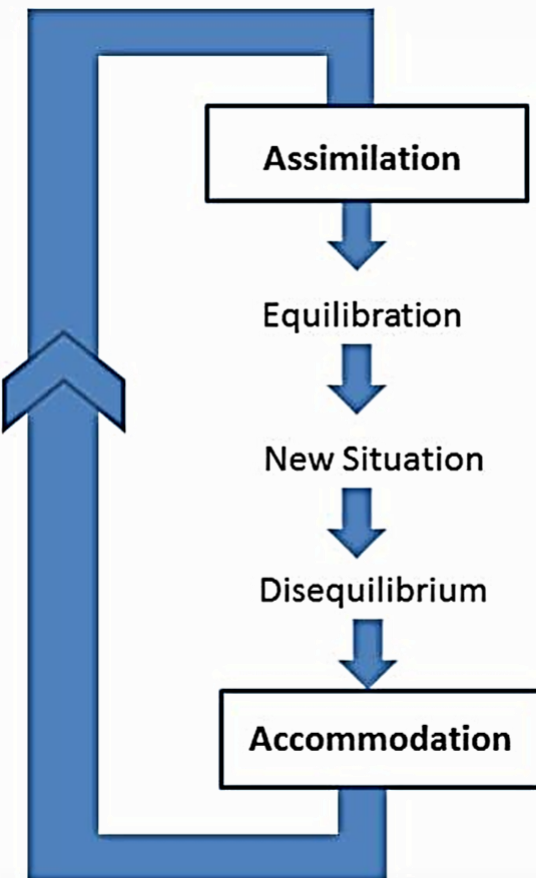




# Consequences for Learning



## Piaget's (1952) Theory of Assimilation and Accommodation



### Principle:

- information which cannot be assimilated
- (e.g. puzzling new problems)
- forces the child to accomodate,
- i.e. to change her mental organization (schemata & structures),
- i.e. to construct new knowledge,
- i.e.: to learn.

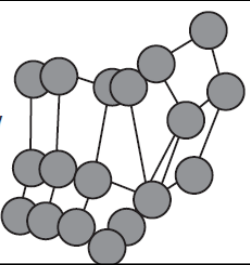
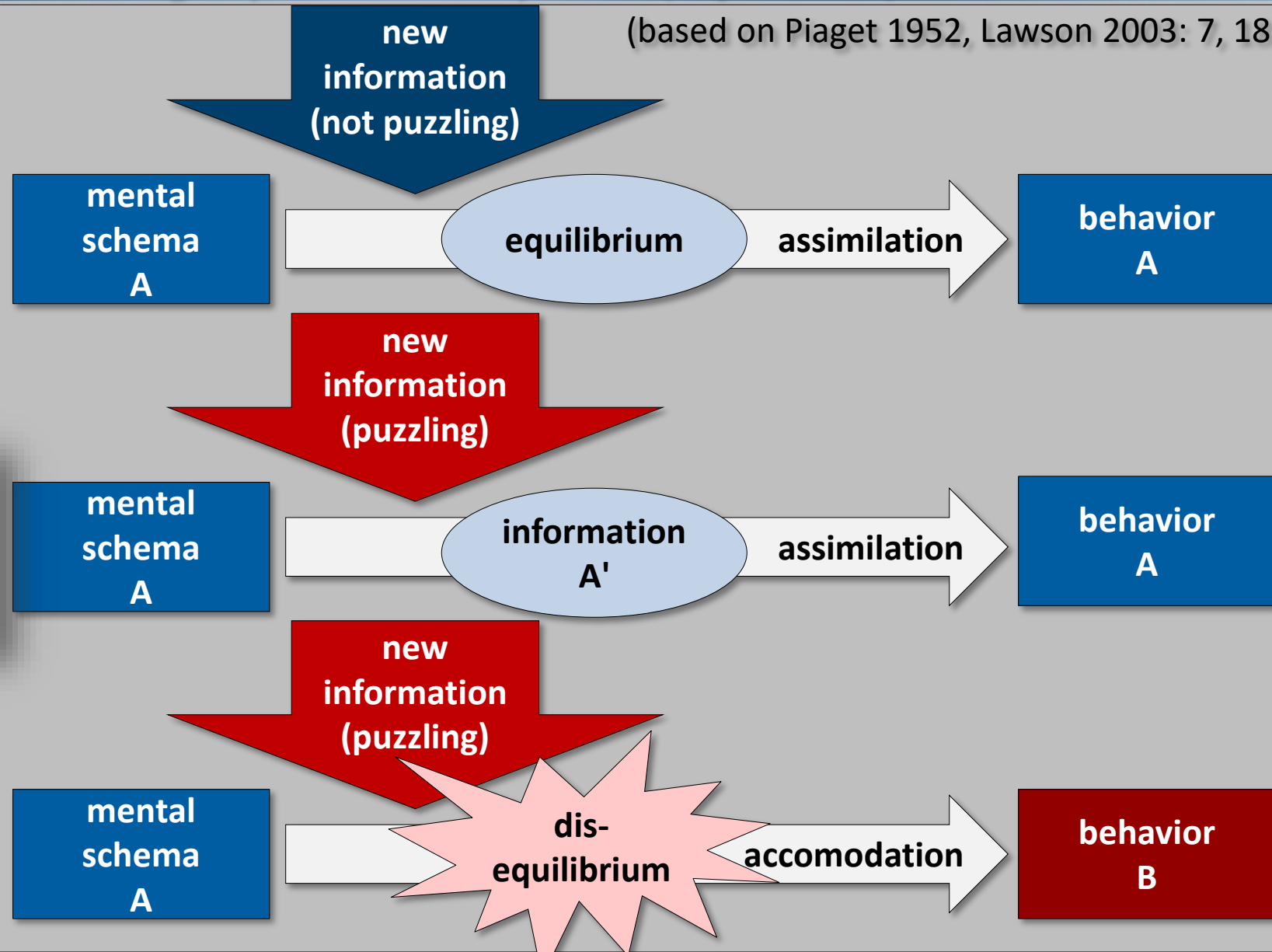
⇒ Learning as process of adaptation to the world



# Consequences for Learning:

Learning as process of adaptation (adjustment) to the world

(based on Piaget 1952, Lawson 2003: 7, 18)





# Brainstorming

dis-  
equilibrium

THINK



PAIR



SHARE

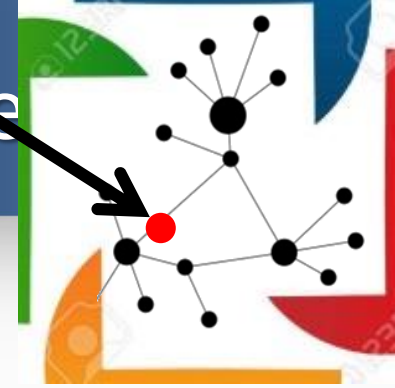
1. What does that mean for the teaching process?
2. What role do *prior experiences* play for "learning"?
3. What role does *problem-solving* play?







# Relevance of Prior World Knowledge



*long-term retention*

- connect new input with what is already known
- **prior knowledge** and **new input** activate different areas of the brain
- their combination facilitates learning
- learning becomes easier and more meaningful

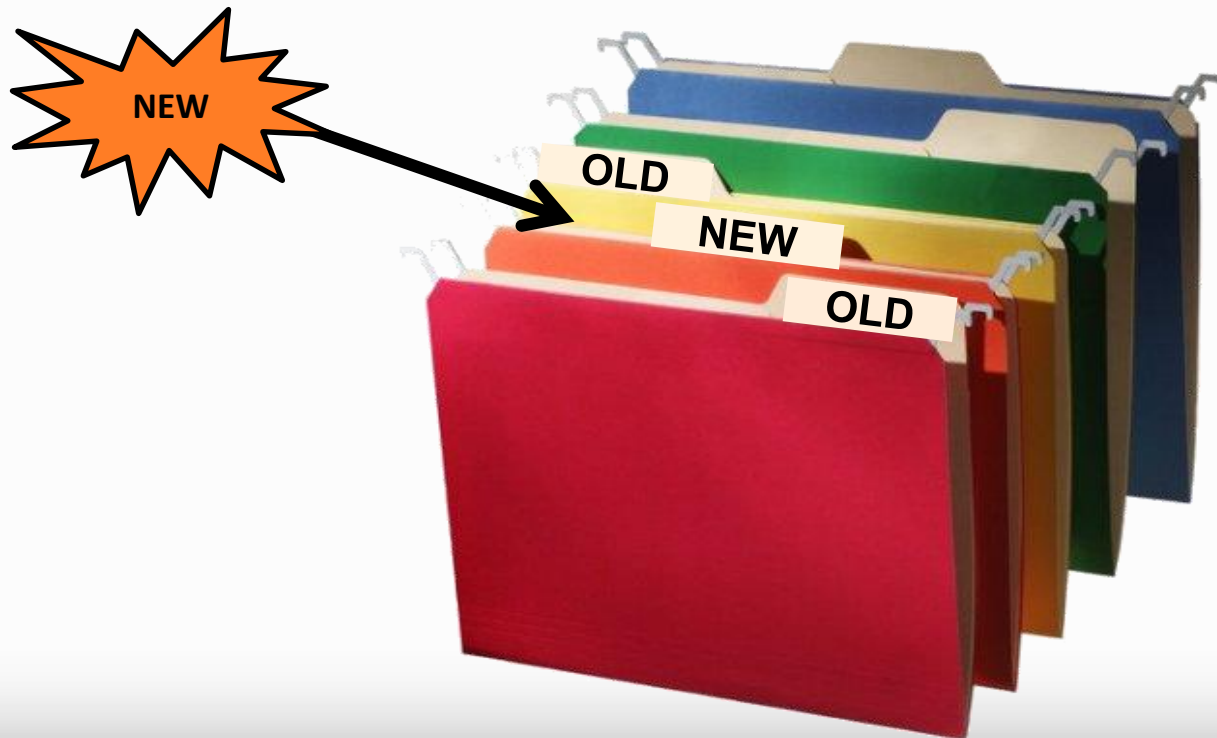
*"it is far **more effective** when one teaches in ways that take what students already know into account and build on, connect with, that knowledge."*

(Lawson 2003:51, bold print KK)



# Relevance of Prior World Knowledge

*"like a folder that you file in the correct place (...) the new knowledge can be **easily retrieved** and used in the future."*

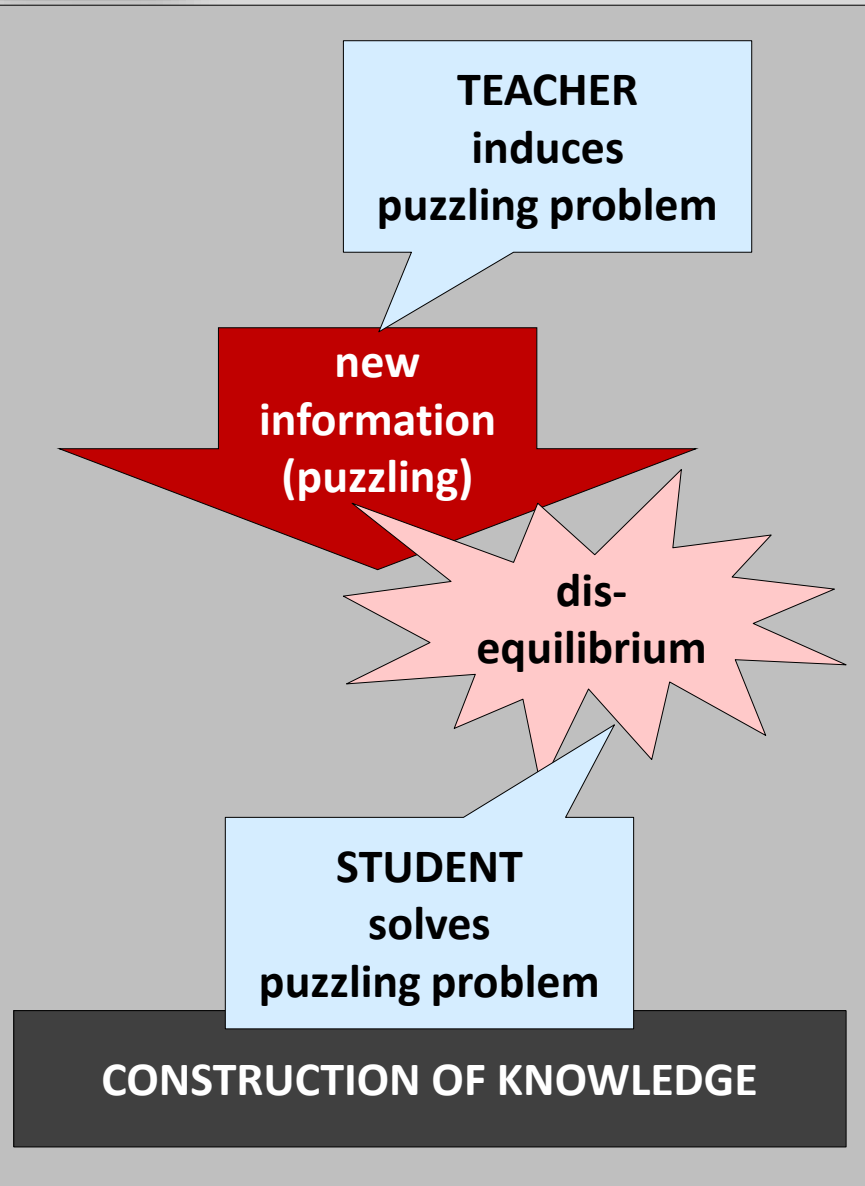




**KEEP  
CALM  
AND  
ACTIVATE PRIOR  
KNOWLEDGE**



# Consequences for Teaching



"[T]he teacher knowledgeable of developmental pathways can produce the environmental pressures that place students into positions in which they can spontaneously **reorganize their thinking** along the path toward more complex and better-adapted thought processes.

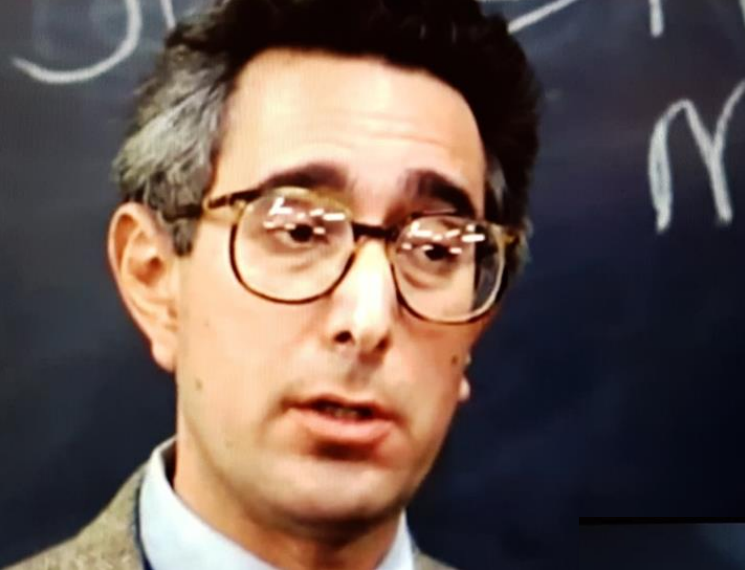
The teacher can be an **instigator of disequilibrium**

and can **provide pieces of the intellectual puzzle for the students to put together.**

Of course the ultimate **mental reorganization** will have to be accomplished by the students but the teacher is far from passive. He or she can set the process on hair trigger"

Lawson (2003:22, bold print KK)





# "Sage on the Stage"

(Aus: *Ferris macht blau*)





# Learning = Knowledge Construction

dis-  
equilibrium

## Paradigm shift in (language) teaching ...

- ⇒ ... from *instructivism* to *constructivism*  
or ...
- ⇒ ... from the "*sage on the stage*"  
to the
- ⇒ ... "*guide on the side*"  
leading to ...
- ⇒ ... active problem-solving by the learner





# At home ...

➤ watch ...

<https://www.youtube.com/watch?v=UCFg9bcW7Bk>

... about the "guide on the side"



# NOTE...

**... problem-solving comes in various disguises!**

- problem-centered / problem-based learning
- critical thinking
- action-oriented learning
- learner autonomy
- discovery learning
- ...
- ?



# Group Work

❖ **Please form groups of four teachers!**

Discuss:

- What aspects are important for problem-solving in the group / classroom?
- How do YOU integrate problem-solving in your activities?
- Please create an outline of an example lesson or activity together!



# Group Work

➤ **During the break, let's hang up:**

1. your example lessons / activities
2. the additional materials you brought from home!



# **Additional Materials for Review at Home**



# Learning = Knowledge Construction

## Lernen = Wissenserwerb = Konstruktion

„Es gibt keine Lernprozesse, die über das subjektive Konstruieren von Bedeutung und das Assimilieren dieser Bedeutung **mit bereits vorhandenen Erfahrungen** [*prior (world) knowledge*] hinausgehen. Lerner konstruieren persönliche Bedeutungen, die auf ihren Lebenserfahrungen basieren. ...

**Es kann nur verstanden und gelernt werden, was sich mit bereits vorhandenem Wissen verbinden (assimilieren) lässt.**

...

Die eingesetzten Konstruktions- und Assimilierungsprozesse sind individuell verschieden, deshalb sind auch die Ergebnisse von Lernprozessen nicht identisch.“

(Wolff 1994: 114, Hervorhebg. KK)





# Learning = Knowledge Construction

## Lernen = Wissenserwerb = Konstruktion

„In der sprachlichen Interaktion werden keine Informationen übertragen,  
sondern nur **Zustandsveränderungen in der Kognition**  
[**Ungleichgewicht: *disequilibrium***] ausgelöst. ...

Entscheidend für unsere Fragestellung sind der konstruktivistische und damit subjektbezogene Charakter menschlicher Wahrnehmung und Erkenntnis ... und schließlich die **Unmöglichkeit, die Wahrnehmung und das Erkennen steuernd von außen zu beeinflussen.**“

(Wolff 1994: 112, Hervorhebung KK)



***"I expect you all to be independent, innovative, critical thinkers who will do exactly as I say!"***



# Construction of Knowledge, Problem Solving, and the Role of Prior Knowledge

"Constructivism is a movement that has grown out of an understanding that **students create their own meaning** for new information or skills from the **interaction** between their **prior knowledge** and **memory of past experience** and the **new experience or information** (Driver, 1983).

This meaning-making process is covert and teachers have **no direct access** to it—they can only **influence** it. Conceptual change can be provoked by providing students with a judicious mix of experiences that **challenge** their current understandings and **new information** (Chinn & Malhotra, 2002).

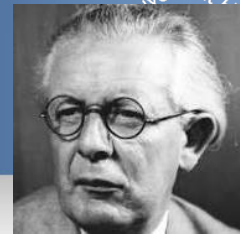
However, conceptual change takes place in the cognitive arena of the students' minds and the degree and nature of change can only be **inferred** by changes in their output.

Some constructivists (...) argue that since students construct their own understanding, **classroom activities**, particularly in science and mathematics, should almost exclusively **employ inquiry techniques** (Bauersfeld, 1995)." (p. 62, bold print KK)

Greive, C., & Hinze, J. (2010). *Visible Learning: A Book Review*. *TEACH* 4(1), 60-63.



# Consequences for Learning



## Piaget's (1952) Theory of Assimilation and Accommodation

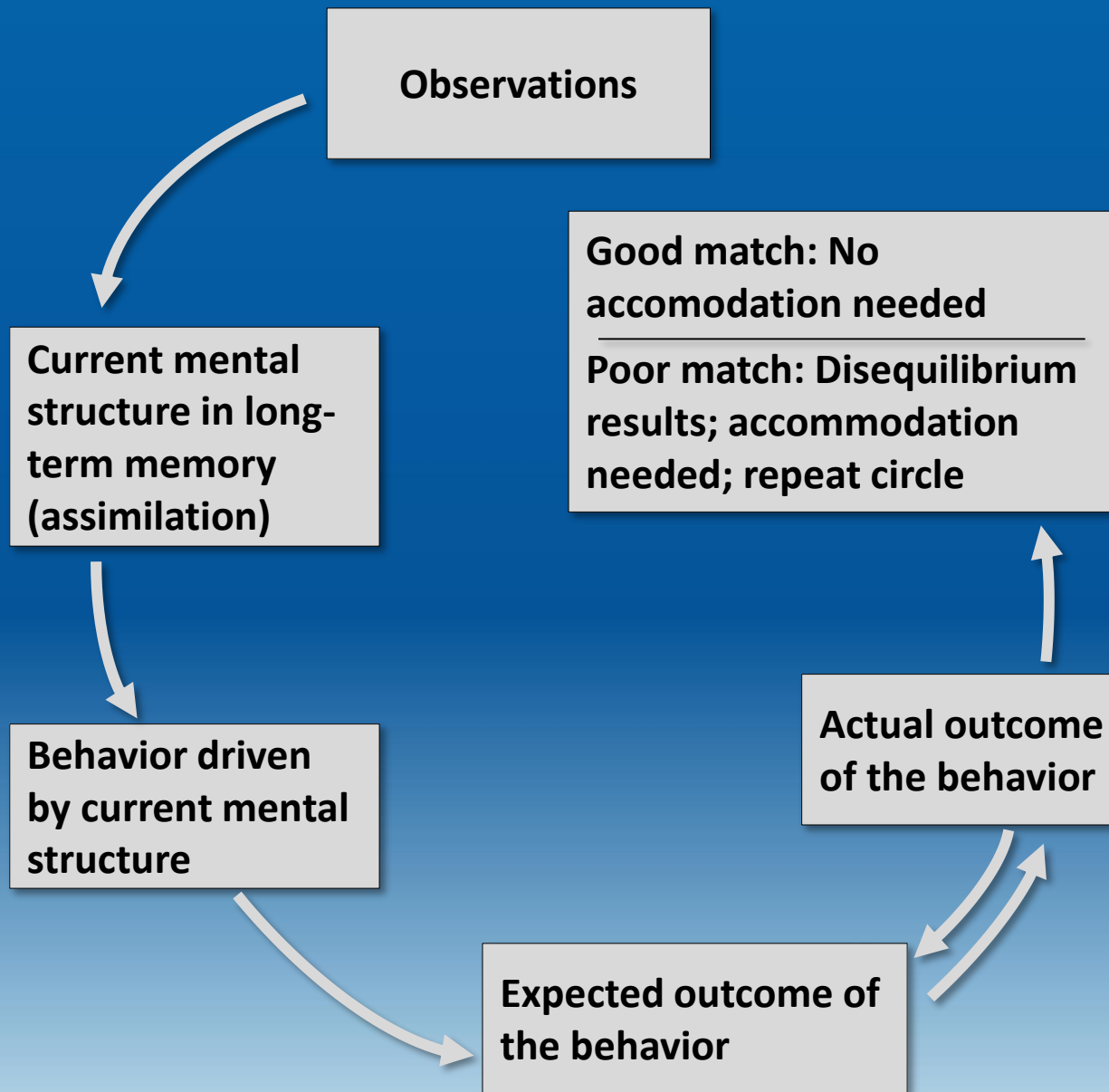
- **Assimilation**

*information is assimilated from the environment to the child's own schemas (i.e. his "model" of the world or his units of knowledge, his capabilities) – his understanding of the world at that given moment ⇒ **equilibrium***

- **Accommodation**

***disequilibrium** (driving force for learning) ⇒ remodeling or replacement of the child's schemas (her knowledge, understanding, abilities) based on new information, and accommodation of her schemas to the (new) reality ⇒ **equilibrium***

⇒ ***Development as process of adaptation to the world:  
Mutual adaptation between inner representation and/or  
perceived information***



## The Elements of Learning






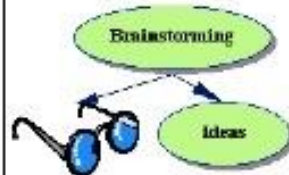





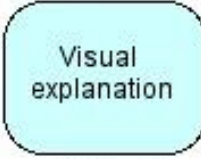
1. Making an initial puzzling observation,
2. raising a causal question,
3. generating a possible cause (an explanation),
4. supposing that the explanation under consideration is correct and generating a prediction,
5. conducting the imagined test,
6. comparing expected and observed results,
7. recycling the procedure

*Figure 3. The basic learning pattern begins with spontaneous assimilation. When expected and observed outcomes do not match, disequilibrium and the need for accommodation results.*

(Lawson 2003: 7ff)



## Activating Prior Knowledge

<b>Quick Write ~ Quick Draw</b>  Take a few minutes to have students "show what they know"	<b>Response Journals</b>  Independent writing to make connections & reflect on learning	<b>Turn &amp; Talk</b>  Turn and share ideas with a partner.
<b>Think-Pair-Share</b>  Think on your own ~ partner with another student to share and discuss ideas.	<b>Brainstorming Bash</b>  Small group brainstorming after independent think time.	<b>Inspiration Web K - W - L Charts</b>  Use of graphic organizers to visually map ideas
<b>Sticky Note Connections</b>  Write ideas or questions on sticky notes. Share & categorize as large group.	<b>Paper Pass or Chart Carousel</b>  Students have 1 min. to write what they know before passing paper to next student to add on.	<b>Graffiti Wall</b>  Students create a wall chart of what they know & add to it throughout unit.
<b>Yes/No Cards</b>  Students hold up cards in response to questions. Can help build interest in new topic.	<b>Discussions</b>  Stimulate connections through small and large group discussions.	<b>Boxing</b> What do I know?  How can I summarize this?

**For more information on these and more strategies:**  
 Gregory, G. & Chapman, C. 2002. *Differentiated Instructional Strategies: One Size Doesn't Fit All*. Corwin Press.  
**Best Practices: Pieces of the Puzzle** - Online resource at  
[http://www.saskschools.ca/curr\\_content/bestpractice/](http://www.saskschools.ca/curr_content/bestpractice/)

<https://s-media-cache-ak0.pinimg.com/736x/49/56/aa/4956aad38fa2cfbb75c7ebc8e3424e5.jpg>





<http://www.ideasforeducators.com/idea-blog/activating-prior-knowledge-helping-students-do-it-independently>



L	I	N	K
(list everything you know)	(inquire about what you want to know)	(now we are going to take notes)	(what do you know now?)

<https://www.middleweb.com/wp-content/uploads/2014/04/Link-strategy-red.png>

## KWL Chart

Topic: \_\_\_\_\_

K	W	L
What I already KNOW	What I WANT to find out	What I LEARNED



# From Instructivism to Problem-Solving

„Wenn Wahrnehmung und Erkennen mentale Operationsprozesse sind, die vom Lernenden individuell auf der Grundlage seines Vorwissens [prior world knowledge] realisiert werden, und wenn unsere Vorstellungen keine objektive Wirklichkeit widerspiegeln, sondern entsprechend der neurobiologischen Auffassung nur die Eigenaktivität unseres Gehirns, das durch unspezifische Impulse der Umwelt gereizt wird, **löst der Lehrende nur den Transport von Energien aus**, welche die Gehirnaktivitäten anregen [in case of puzzling problems: creation of a *disequilibrium*], aber niemals von bedeutungstragenden Informationen.“

(bold print and additions KK)

Overmann, M. (2002). Konstruktivistische Prinzipien und ihre didaktischen Implikationen. In G. Bach, B. Viebrock (ed.), *Die Aneignung fremder Sprachen: Perspektive – Konzepte – Forschungsprogramm*. Frankfurt a.M.: Lang, S. 80.



# From Instructivism to Problem-Solving

"[Lyons et al. 2003] revealed the **prevalence of drill and practice** (...) as the norm for the teachers who participated. The teachers tended to see learning as principally about memorizing formulas and procedures rather than teaching to provide **reasons for solutions**, or teaching to **think creatively**. (...)

[In the teaching of English] 92 percent of the classroom discourse was teacher directed (...) The power relationship where the teacher was the expert and the pupil was to listen and remember characterized both English teaching and mathematics teaching."

Today, we observe "(...) a shift in focus from the **teacher as teacher of a set curriculum** to an emphasis on the **learner as a problem solver**. This implied a shift in the role of the teacher **from giving information** to the learner to a role of **partnership** between teacher and learner, with the teacher as a partner **facilitating the emergence of novel ways of understanding** in the learner."

(Gash 2015:7ff, bold print KK)



# From Instructivism to Problem-Solving

"(...) a shift in focus from the **teacher as teacher of a set curriculum** to an emphasis on the **learner as a problem solver**. This implied a shift in the role of the teacher **from giving information** to the learner to a role of partnership between teacher and learner, with the teacher as a partner **facilitating the emergence of novel ways of understanding** in the learner. Traditionally, **direct teaching** has its methods of presenting set material in interesting ways and then ensuring that the students know what was taught with an emphasis on memory. This method minimizes student differences and may assume that students will have little difficulty learning the material or they are all learning at the same speed. Difficulties arise quickly when some students show different aptitudes for the material. In this case, either the ones who learn quickly have to wait or the ones who learn more slowly are left behind and the danger is that many will cease to engage with learning. More student-centered approaches engage all students in educationally related tasks so that the tasks they are working on provide opportunities to learn. To facilitate this, the material may be presented through cooperative activity"

(Gash 2015:7, bold print KK)





# Assimilation and Accommodation

## **Fosnot & Perry (2005:18):**

In order to understand the concept of equilibration, one must think of it as a dynamic process in an organism functioning at far from equilibrium states, not as a static equilibrium. Piaget was fascinated by the work of Prigogine on dissipative structures, and the idea of self-organizing as a result of activity and bifurcations was key. Equilibration has often been misinterpreted in the literature. It is not a sequential process of assimilation, then conflict, then accommodation; it is not linear. Nor is assimilation a process of “taking in information” as it has sometimes been described. Equilibration is instead a nonlinear, dynamic “dance” of progressive equilibria, adaptation and organization, growth and change. It results from “coupling” with our surround. As we assert ourselves with our logical constructs and “act on” new experiences and information, we exhibit one pole of behavior—the pole of activity on the surround; our reflective, integrative, accommodative nature is the other pole—the pole of self-organization. These two poles provide a dynamic interplay, which by its own intrinsic, dissipative nature serves to keep the system in an open, flexible, growth-producing state.





# From Instructivism to Problem-Solving

"... we do not want to revert to a view of learning as passive knowledge acquisition. The active role that the learner plays in acquiring knowledge must be clearly understood. Learners must be actively engaged in knowledge building.

The role of instruction is to constrain and guide their activities.

The question of how much guidance is optimal for learning is a separate issue."

(Kintsch 2009:223, in Tobias & Duffy (eds., 2009)



# Relevance of Prior World Knowledge

"The second way to learn is to **connect the new input with something that is already known**. The **new input** boosts the **pre-synaptic activity** [in the nerve cells which process this information], while the **prior learning** boosts the **post-synaptic activity**. So together they reach threshold and cause a change in transmitter release rate. This sort of learning can take place without such a massive amount of effort spent in boosting the new input.

Further, **the new learning is not meaningless because it is connected to what one already knows**. So learning is **easier** and it is **meaningful**. Further, like a folder that you file in the correct place in a filing cabinet, instead of piling it carelessly on a shelf where it gets buried under subsequent folders, the new knowledge can be **easily retrieved** and used in the future.

**Consequently, it is far more effective when one teaches in ways that take what students already know into account and build on, connect with, that knowledge.**

Without making such connections students will not know how the new knowledge fits with, or perhaps does not fit with, prior conceptions. Thus, **little long-term retention occurs** and/or students may acquire conflicting conceptions and not even know it (e.g., Lawson & Thompson, 1988)."

(Lawson 2003:51, bold print KK)



# The Learner

"a constructivist view of learning suggests an approach to teaching that gives learners the opportunity for concrete, contextually meaningful experience through which they can search for patterns, raise their own questions, and construct their own models, concepts, and strategies.

...

(C. T. Fosnot 1996: ix)



# The Classroom

The classroom in this model is seen as a minisociety, a community of learners engaged in activity, discourse, and reflection.

...

(C. T. Fosnot 1996: ix)

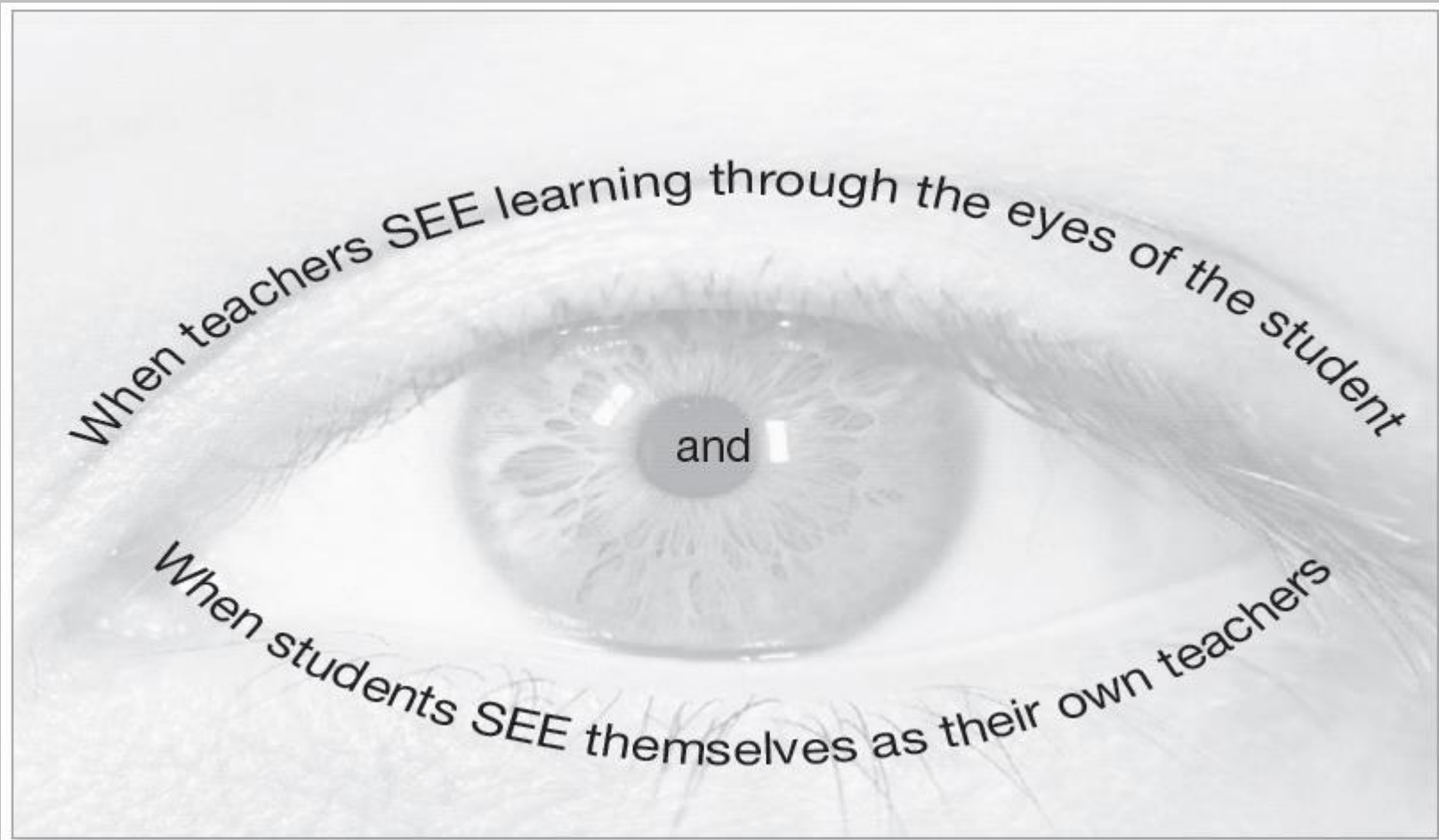
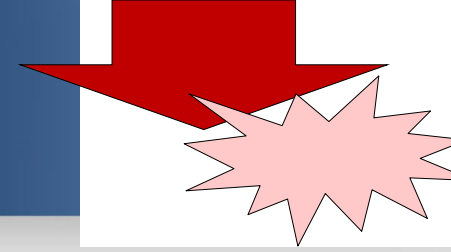


# The Teacher

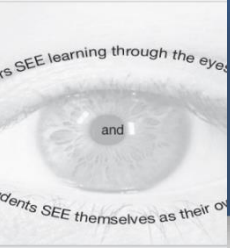
- Learning in a context, in which learners can make **experiences of their own**
- Learners asks **genuine questions** of their own, and thus come to **conclusions of their own**, which they incorporate in their knowledge
- **The role of the teacher changes from presenter of questions and answers to somebody who encourages the children to use their own creativity, problem-solving mechanisms, to reach their own conclusions**



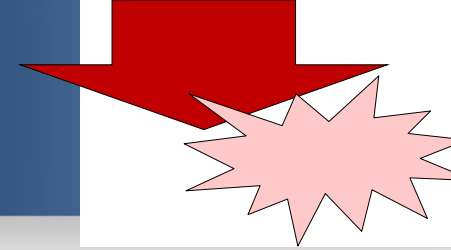
# Consequences for Learning







# Consequences for Learning



## Learners

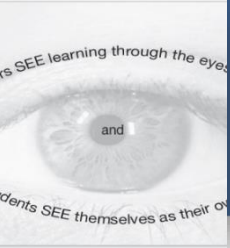
"[S]tudents come into classes with preconceptions about how the world works, and teachers need to engage with this initial understanding [*prior world knowledge*] otherwise the students may fail to grasp the new concepts and information.

... students learn to take control of their own learning by defining learning goals and monitoring their progress in achieving them. The key questions are: "Where are we going?", "How are we going?", and "Where to next?".

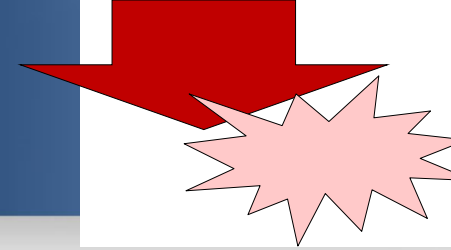
... **learning requires the active involvement of the learner**; learning is primarily a social activity; **new knowledge is constructed on the basis of what is already understood and believed**; we learn by employing effective and flexible strategies that help us to understand, reason, memorize, and solve problems; learners must know how to plan and monitor their learning, how to set their own learning goals, and how to correct errors

... students must learn how to solve internal inconsistencies [*disequilibrium*] and restructure existing conceptions [*accomodation*] when necessary"

Hattie (2015: 42, bold print KK)



# Consequences for Teaching

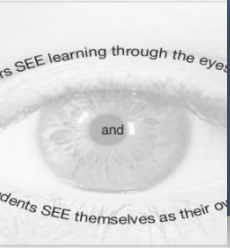


## Teachers

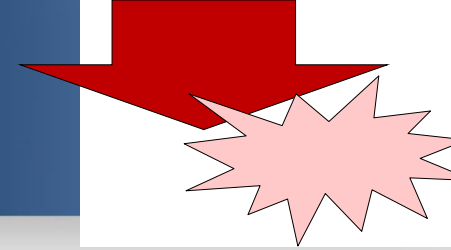
"This means that teachers need to be "adaptive learning experts" (Bransford et al., 2000; Hatano & Inagaki, 1986), who not only use many of the effective strategies outlined in these chapters but also have high levels of flexibility that allow them to innovate when routines are not enough. They can ascertain when students are not learning, know where to go next, can adapt resources and strategies to assist students meet worthwhile learning intentions, and can recreate or alter the classroom climate to attain these learning goals.

"Adaptive experts also know how to continuously expand their expertise, restructuring their knowledge and competencies to meet new challenges" (Darling-Hammond, 2006, p. 11). They have the empathy required "to express concern and take the perspective of a student and it involves cognitive and affective domains of empathy" (Tettegah & Anderson, 2007, p. 50). This involves hearing "the intent and emotions behind what another says and reflecting them back by paraphrasing" (Woolfolk Hoy, 1998, p. 466). Further, teachers need to pay special attention to the way children define, describe, and interpret phenomena and problem-solving situations and begin to understand these experience from the unique perspectives of students (Gage & Berliner, 1998)."

Hattie (2015: 42)



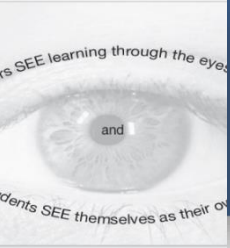
# Consequences for Teaching



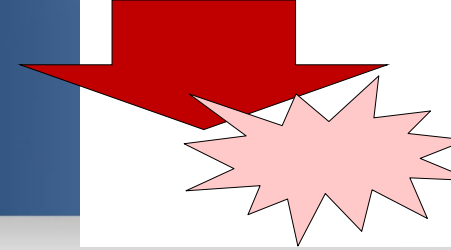
## Teachers

"[T]he story is about the visibility of teaching and learning; it is the power of passionate, accomplished teachers who focus on students' cognitive engagement with the content of what it is they are teaching. It is about teachers who focus their skills in developing a way of thinking, reasoning, and emphasizing problem solving and strategies in their teaching about the content they wish students to learn. It is about teachers enabling students to do more than what teachers do unto them; it is the focus on imparting new knowledge and understanding and then considering and monitoring how students gain fluency and appreciation in this new knowledge and build conceptions of this knowing and understanding. It is how teachers and students strategize, think about, play with, and build conceptions about worthwhile knowledge and understanding."

Hattie (2015: 31)



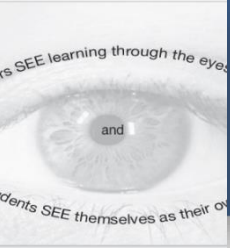
# Consequences for Teaching



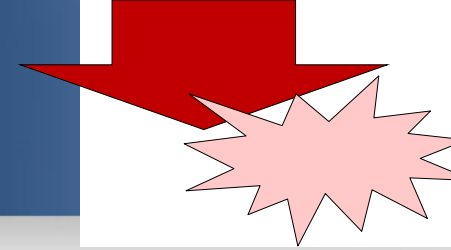
## "Signposts towards excellence in education"

1. "Teachers are among the most powerful influences in learning.
2. Teachers need to be directive, influential, caring, and actively and passionately engaged in the process of teaching and learning.
3. Teachers need to be aware of what each and every student in their class is thinking and what they know, be able to construct meaning and meaningful experiences in the light of this knowledge of the students, and have proficient knowledge and understanding of their subject content so that they can provide meaningful and appropriate feedback such that each student moves progressively through the curriculum levels.
4. Teachers need to move from the single idea to multiple ideas, and to relate and then extend these ideas such that learners construct, and reconstruct, knowledge and ideas, it is not the knowledge or ideas, but the learner's construction of this knowledge and ideas that is critical.
5. School leaders and teachers need to create schools, staffrooms, and classroom environments in which error is welcomed as a learning opportunity, in which discarding incorrect knowledge and understandings is welcomed, and in which teachers can feel safe to learn, re-learn, and explore knowledge and understanding."

(Hattie 2015:26)



# Consequences for Teaching



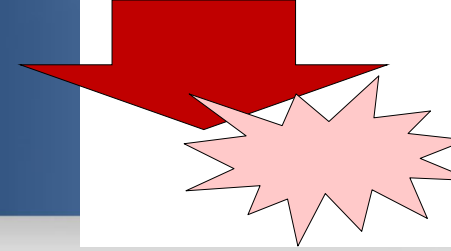
## Teachers:

- "Focus on students' cognitive engagement with the content of what it is that is being taught;
- Focus on developing a way of thinking and reasoning that emphasizes problem-solving and teaching strategies relating to the content that they wish students to learn; (...)
- Focus on providing feedback in an appropriate and timely manner to help students to attain the worthwhile goals of the lesson;
- Seek feedback about their effect on the progress and proficiency of all their students;
- Have deep understanding of how we learn; and
- Focus on seeing learning through the eyes of the students, appreciating their fits and starts in learning, and their often non-linear progressions to the goals, supporting their deliberate practice, providing feedback about their errors and misdirection, and caring that the students get to the goals and that the students share the teacher's passion for the material being learnt."

(Hattie 2015:27)



# Consequences for Teaching



"In short, the teacher who takes self-regulation theory to heart becomes a poser of questions, a provider of hints, a provider of materials, a laboratory participant, a class chairman and secretary. He/she gathers the class together and solicits data gathered and their meaning. Most importantly, the teacher is not a teller. He/she is a facilitator and director of learning. If materials are well chosen, good questions are posed, timely ideas are suggested, and students are prompted to think through questions, alternatives answers, and data, then much can be done to encourage the acquisition of more adaptive mental structures."

(Lawson 2003:24)





# Summary: The Learner

- Learning is an active process carried out by the learner
- Learners need to formulate their own problems and hypotheses, and the find solutions to them on their own
- Errors and contradictions are part of this process of problem-solving
- Learners present and defend their hypotheses on their own in the classroom dialogue
- Ideas are accepted if they can be shared by the (classroom) community
- Learners continually develop new concepts; new ideas lead them to either generalize existing concepts, to re-organize them, or to reject them
- Teachers have to create space for this process



# Summary: The Teacher

- Teachers listen closely to their students, take their thoughts seriously, and analyze them
- Teachers are willing to neglect their own perspectives for a while for the benefit of those of the learners, and do not immediately evaluate
- Teachers leave enough time for learners to use all means of expression
- Teachers reinforce the learners' self-confidence and involve them in the process of problem-solving
- Teachers accept that the final results have individual differences, and that they may deviate to some extent from their own representations
- But they negotiate the solution with the learners until a compatible understanding has been found
- Teachers play the role of a facilitator and accept that the traditional hierarchy is partly dissolved



# For Further Information About the Brain: Video Clips for Schools!

[www.youtube.com/watch?v=gXwrh6XOACA&nohtml5=False](http://www.youtube.com/watch?v=gXwrh6XOACA&nohtml5=False)

[www.youtube.com/watch?v=KU62jMxA5oc](http://www.youtube.com/watch?v=KU62jMxA5oc)

## **Funktion von Neuronen**

<https://www.youtube.com/watch?v=20m6fhh-G7U>

## **Ruhepotential**

<https://www.youtube.com/watch?v=lqq6lu3WouY>

## **Aktionspotential**

<https://www.youtube.com/watch?v=T-YQRCWnoJs>

## **Reizweiterleitung im Axon**

<https://www.youtube.com/watch?v=8O80eTzo0Pg>

## **Synapse Reizübertragung**

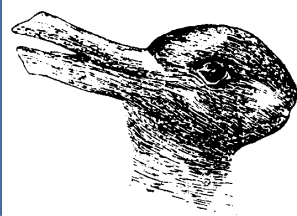
<https://www.youtube.com/watch?v=bmvUnIGyfol>

## **Synapse Informationsübertragung**

<https://www.youtube.com/watch?v=xSJjGFeJ4g>



# Check out...



## Brain Tricks – this is how your brain works

➤ <https://www.youtube.com/watch?v=JiTz2i4VHFw>

## ... at home!

