



# Mythen in der Entwicklungspsychologie

Moritz Daum

Lehrstuhl Entwicklungspsychologie: Säuglings- und Kindesalter

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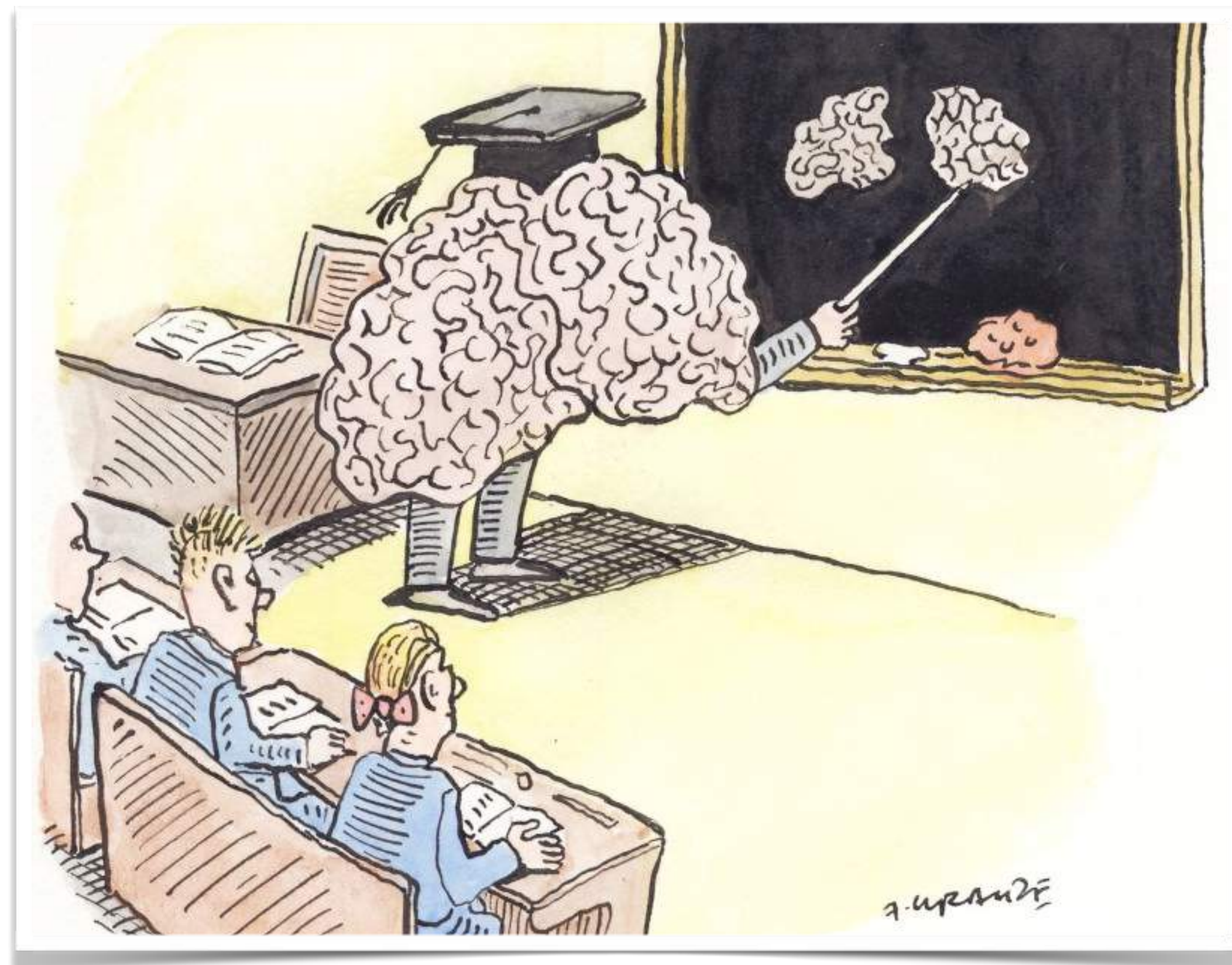
## Mythos / Mythen

- (maskulin, von altgriechisch μῦθος, „Laut, Wort, Rede, Erzählung, sagenhafte Geschichte, Mär“, lateinisch mythus; Plural: Mythen)
- Ist in seiner ursprünglichen Bedeutung eine Erzählung. Im religiösen Mythos wird das Dasein der Menschen mit der Welt der Götter verknüpft.



## Neuromythos

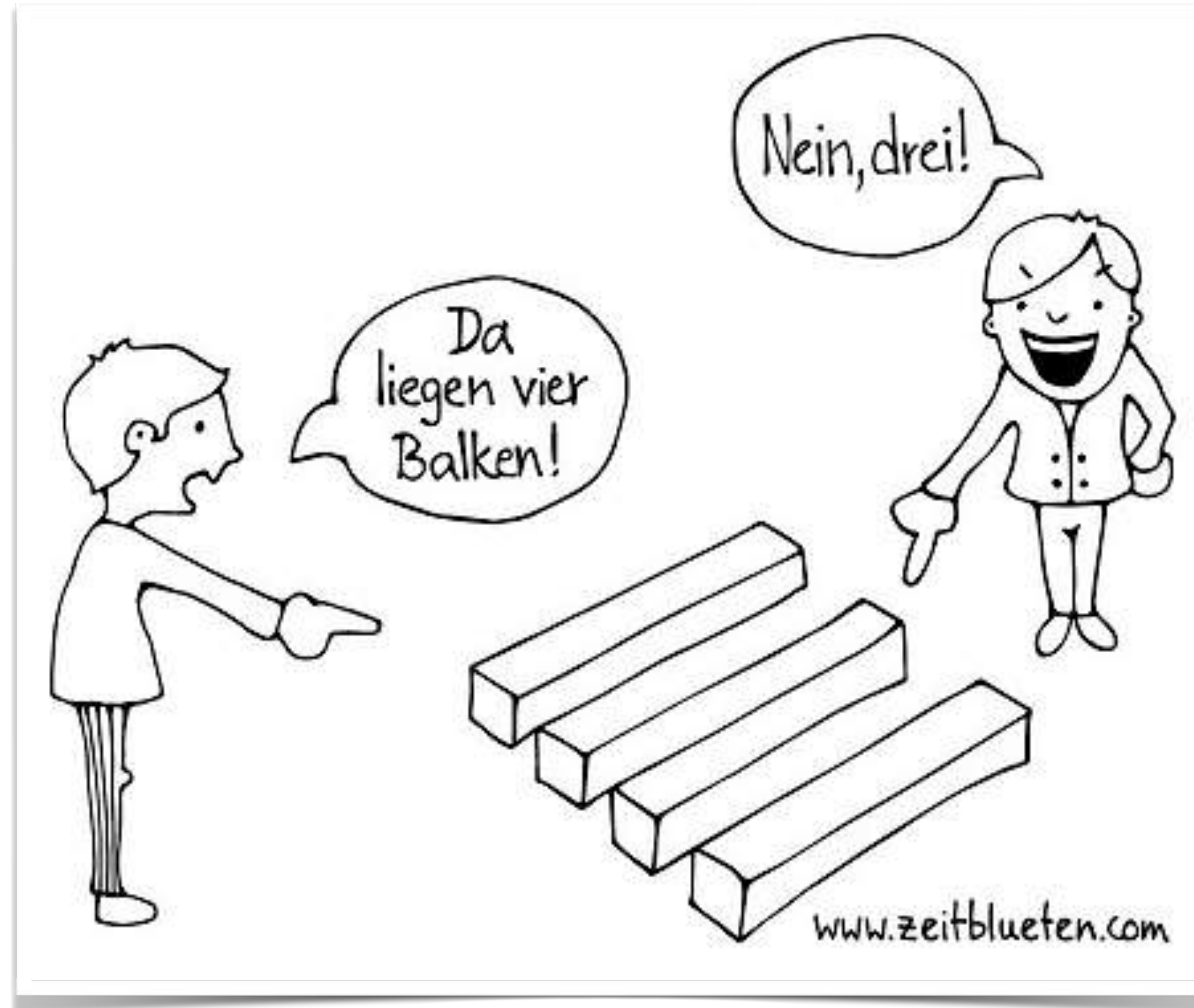
- „[...] misconception generated by a misunderstanding, a misreading or a misquoting of facts scientifically established (by brain research) to make a case for use of brain research in education and other contexts”.



OECD, 2002



## Zentrale (Streit-)Fragen



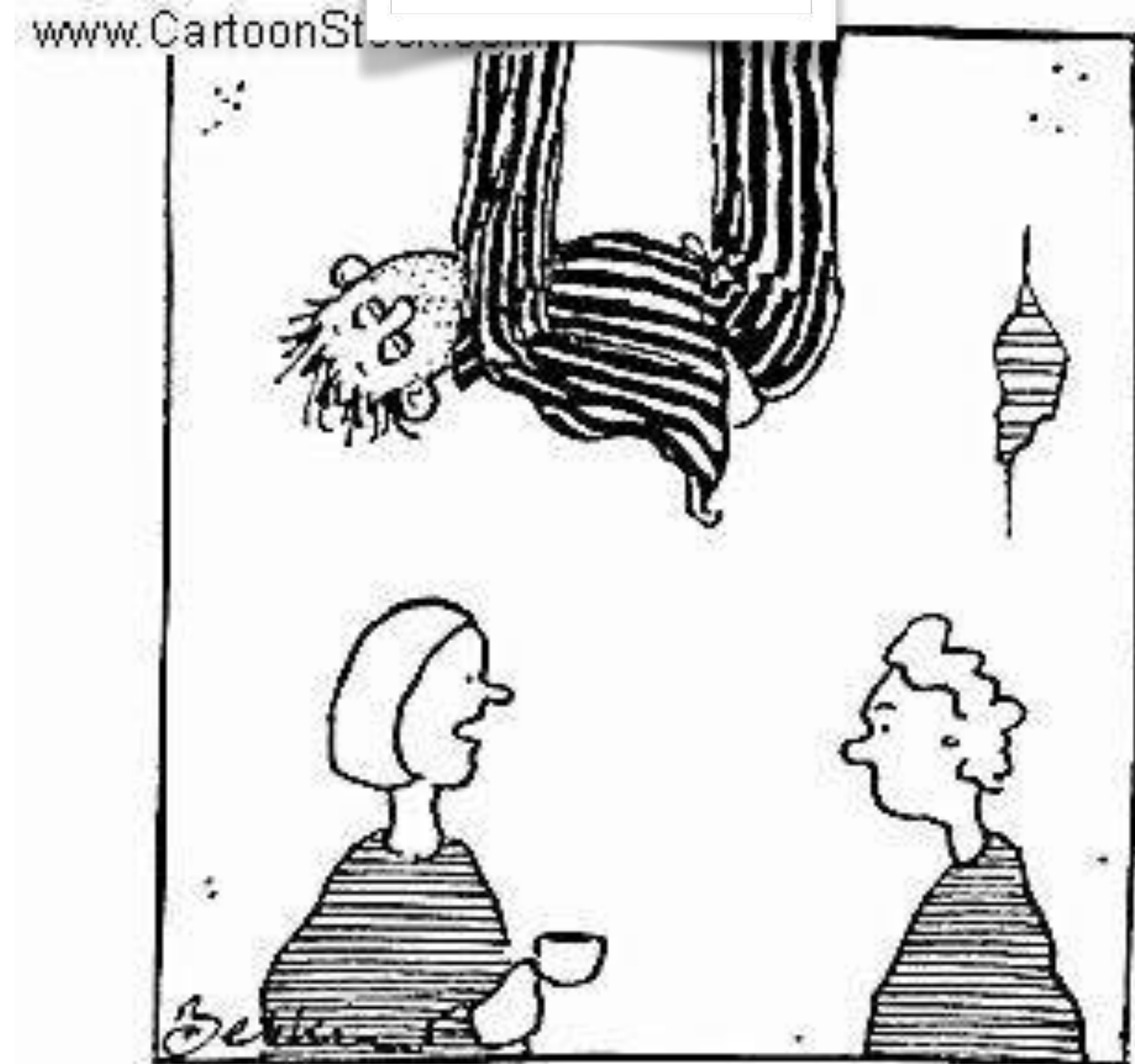


## Nature - Nurture

Nature



Nurture

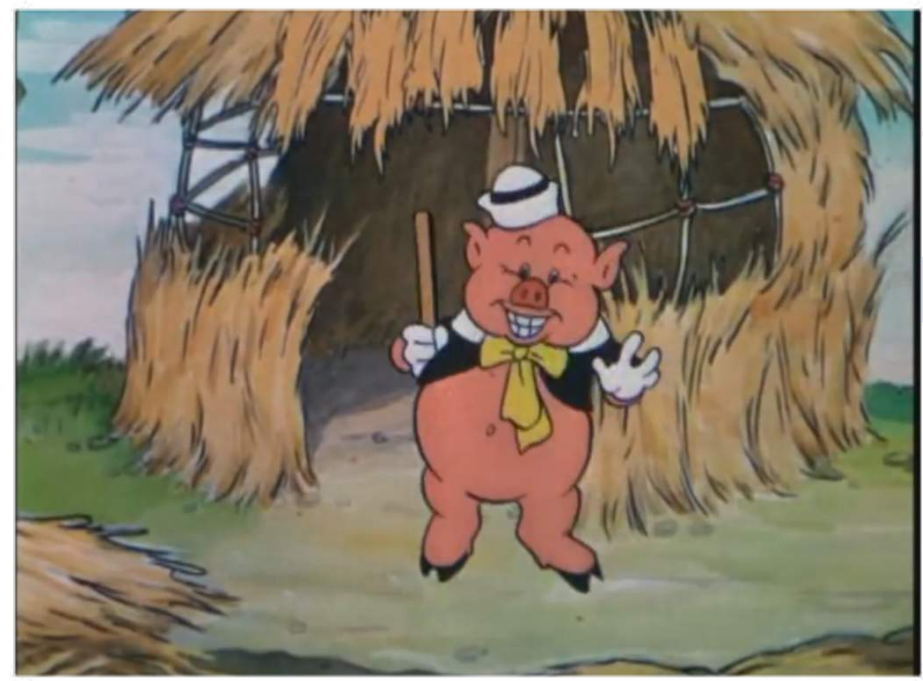


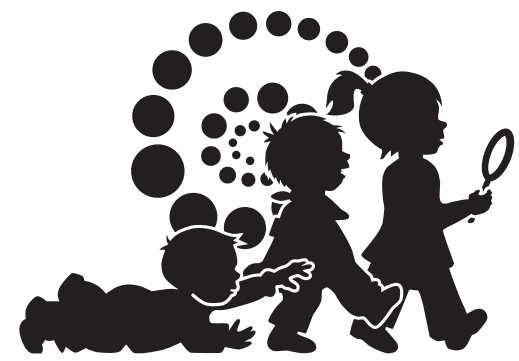
"Trevor was raised in the wild by sloths."

# Zentrale (Streit-) Fragen



pretation



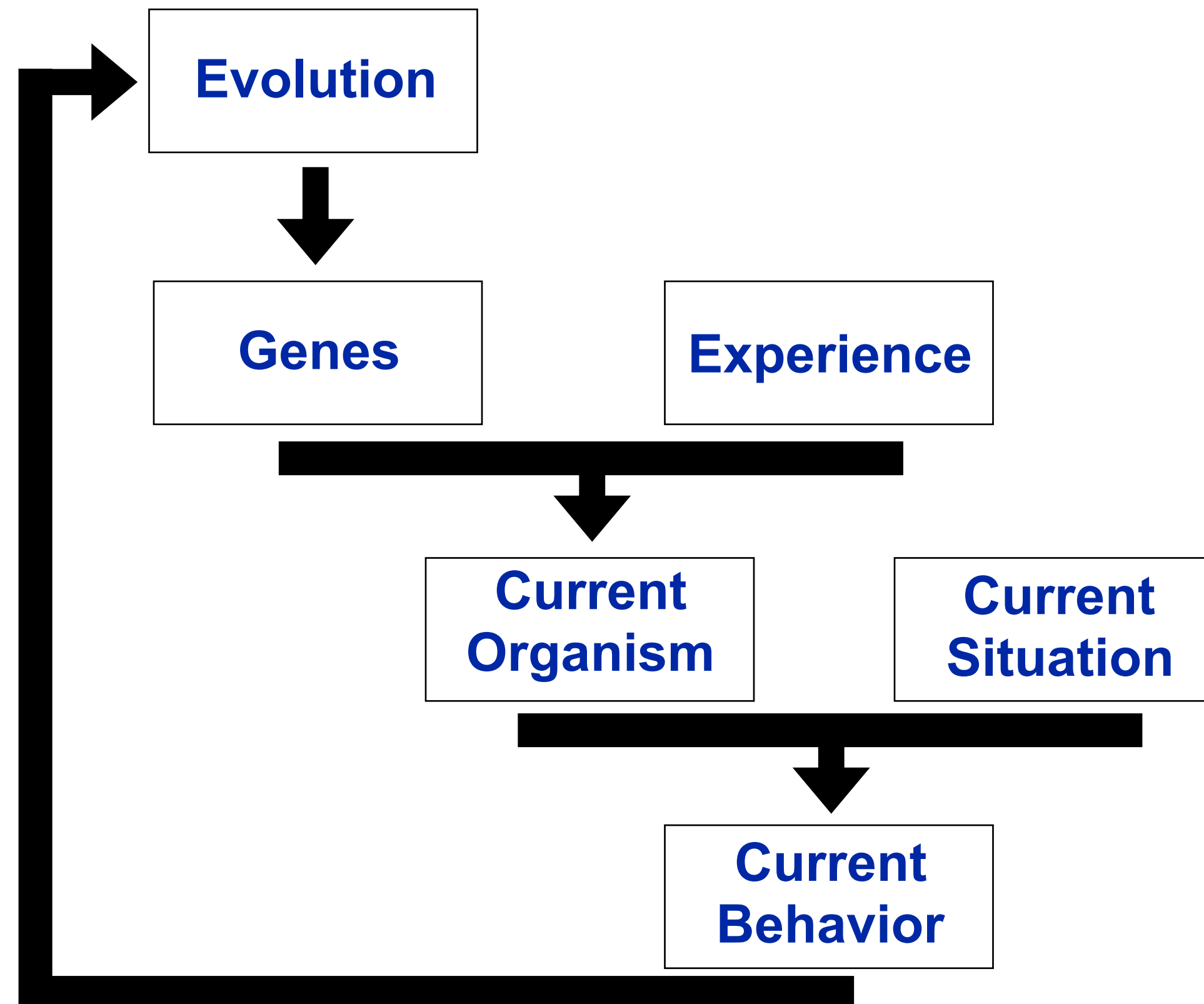


## Nature - Nurture: Interpretation





## Nature - Nurture → Zusammenspiel beider Faktoren







## Nomothetisch vs. Idiographisch



### **Nomothetisch**

Forschungsrichtung, bei der das Ziel wissenschaftlicher Arbeit *allgemeingültige Gesetze* sind.

Nomothetische Theorien abstrahieren von den Phänomenen.



## Nomothetisch vs. Idiographisch

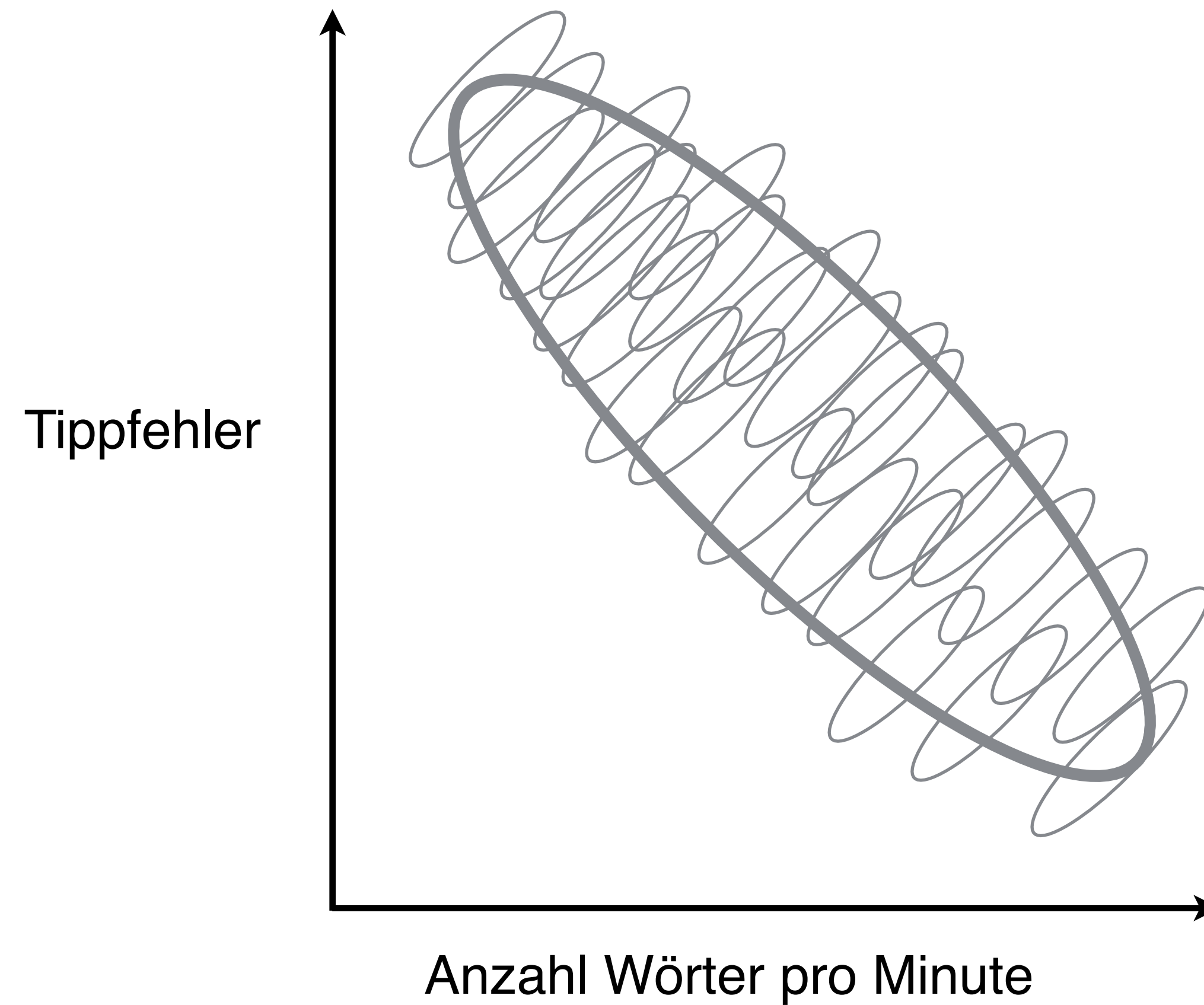


### **Idiographisch**

Forschungsrichtung, bei der das Ziel die umfassende Analyse konkreter, zeitlich und räumlich einzigartiger Gegenstände ist.



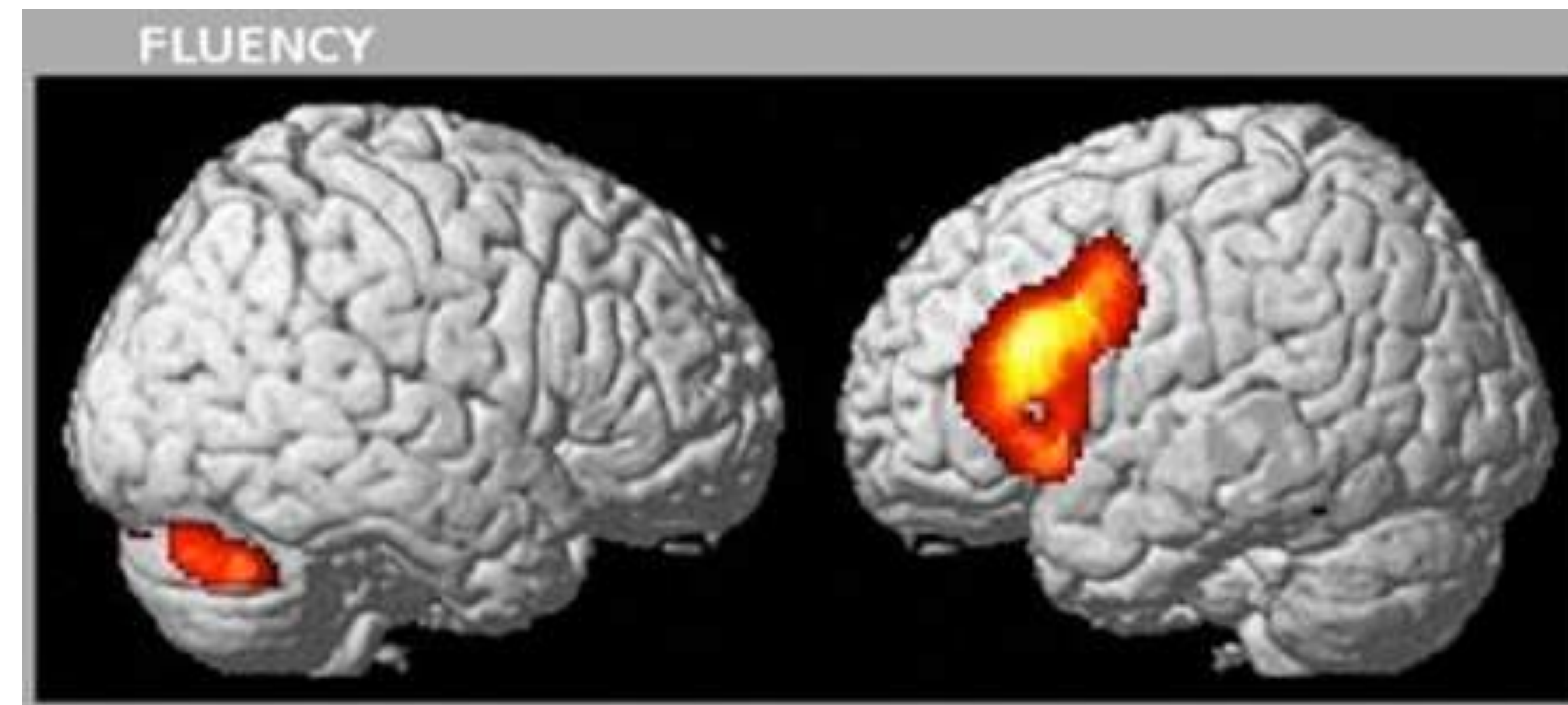
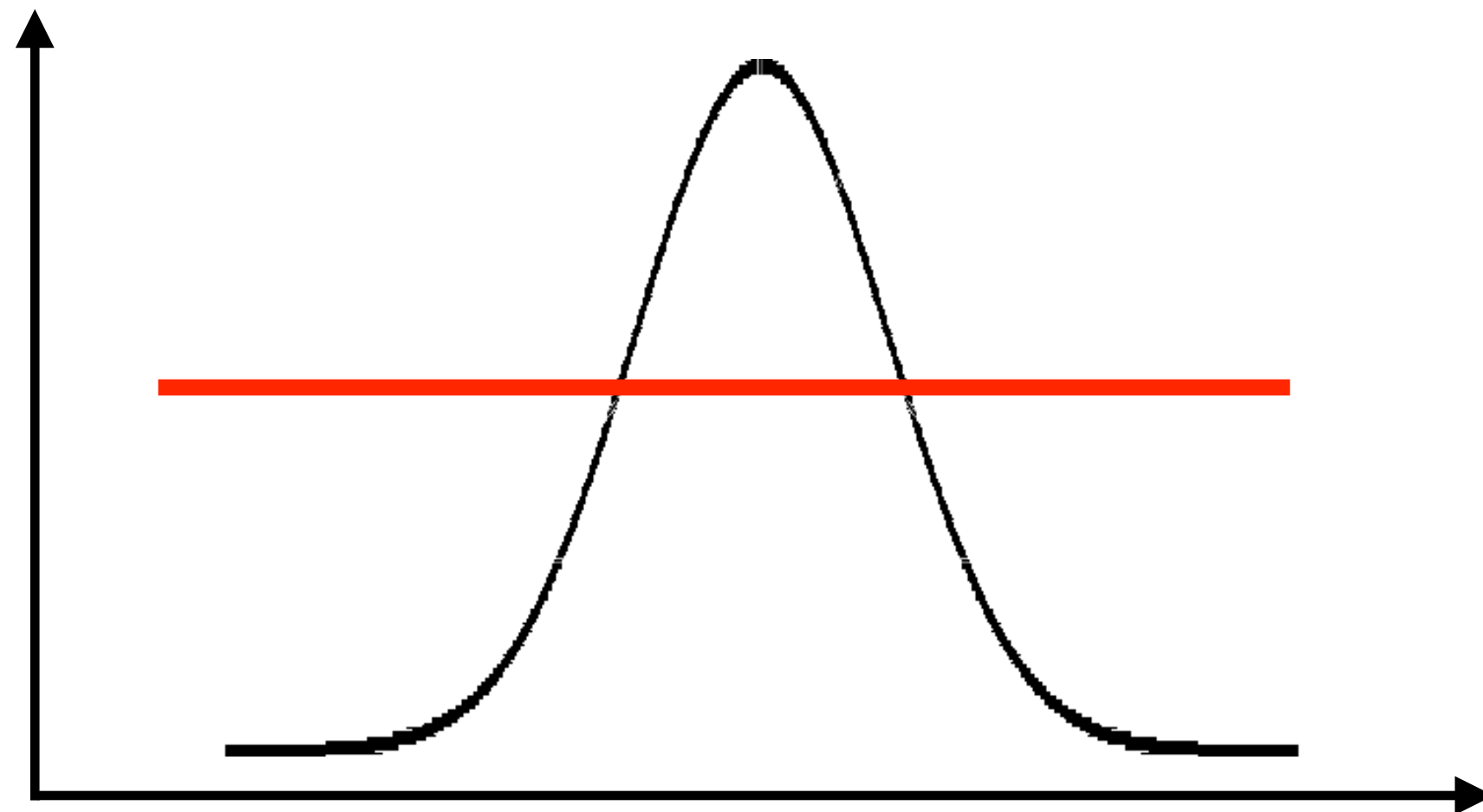
## Nomothetisch vs. Idiographisch: Beispiel Schreibmaschinenschreiben



*Hamaker, 2012*

## Interpretation von Hirnbildern

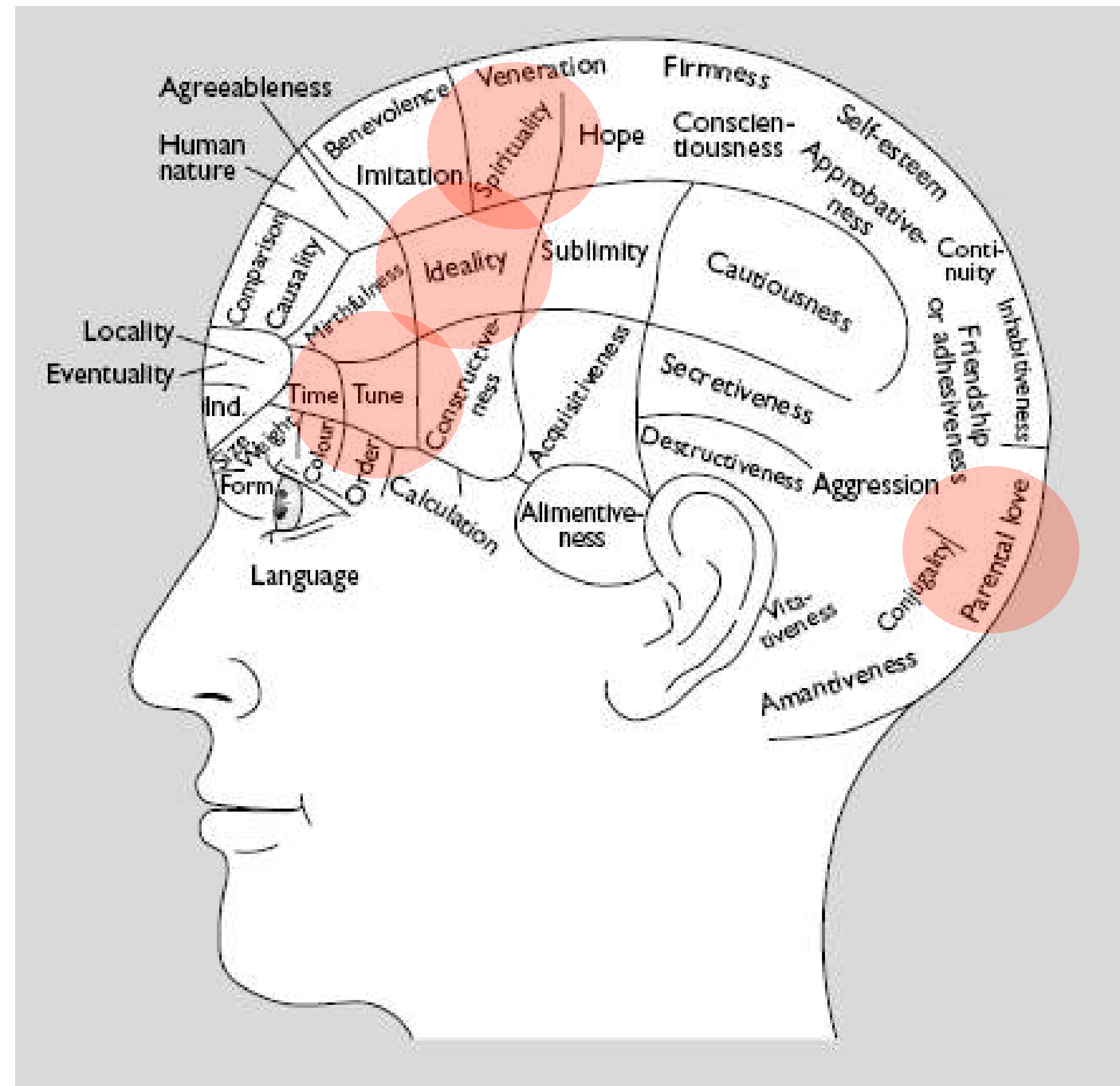
- Missinterpretation anschaulicher Hirnbilder (e.g. fMRT).
- Zeigen nicht Aktivierung per se sondern Unterschiede in der Aktivierung.



*e.g., Cerri et al., 2014*



## Interpretation von Hirnbildern

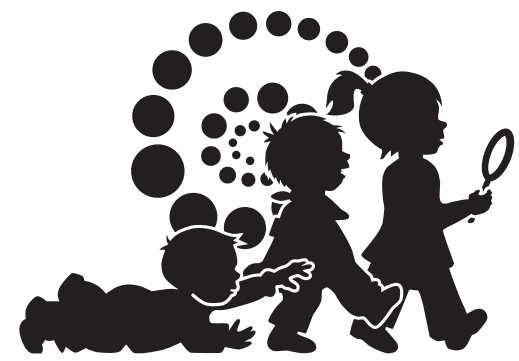


*Franz Joseph Gall*



# Mythen in der (Entwicklungs-)Psychologie





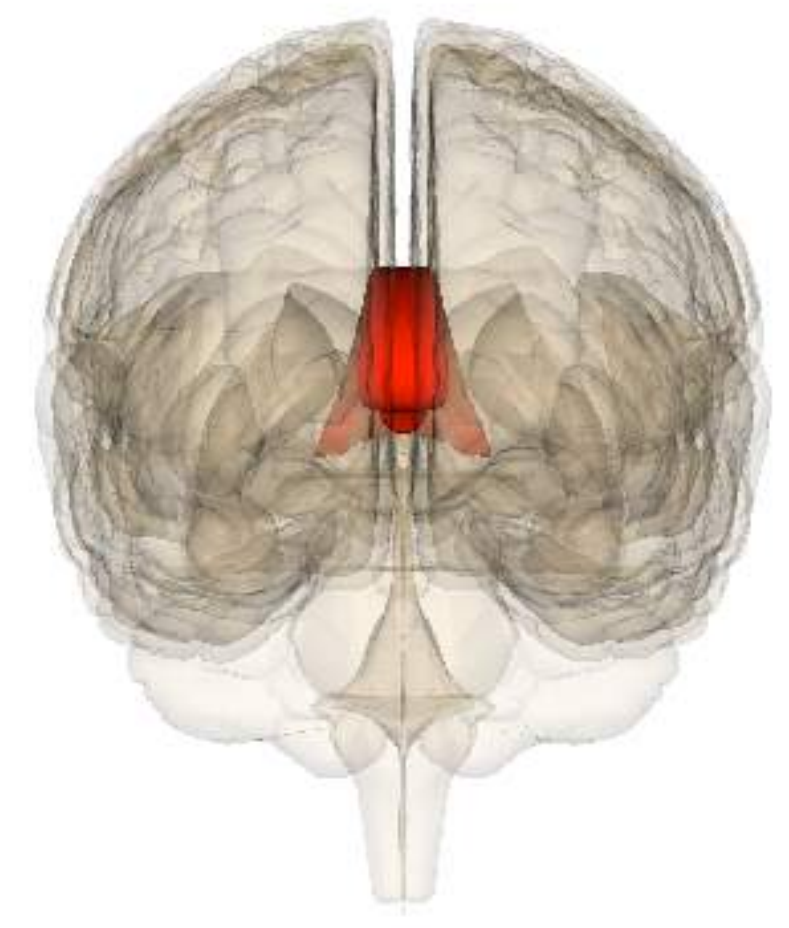
## Unterschiedliche Hemisphären - Unterschiedliche Lernstile





## Unterschiedliche Hemisphären - Unterschiedliche Lernstile

- Differenzierung zwischen Rechtshirn-Lernenden und Linkshirn-Lernenden
- Dominanz bei rechter Hemisphäre
  - ▶ Verarbeitung von Formen und Mustern, räumlicher Manipulation, Rhythmus, Bildern und Bildern, Tagträumen und Beziehungen
- Dominanz bei linker Hemisphäre
  - ▶ Sprache, Logik, mathematische Formeln, Anzahl, Sequenz, Linearität, Analyse, unabhängige Sachinformationen.



*e.g., Cerri et al., 2014*



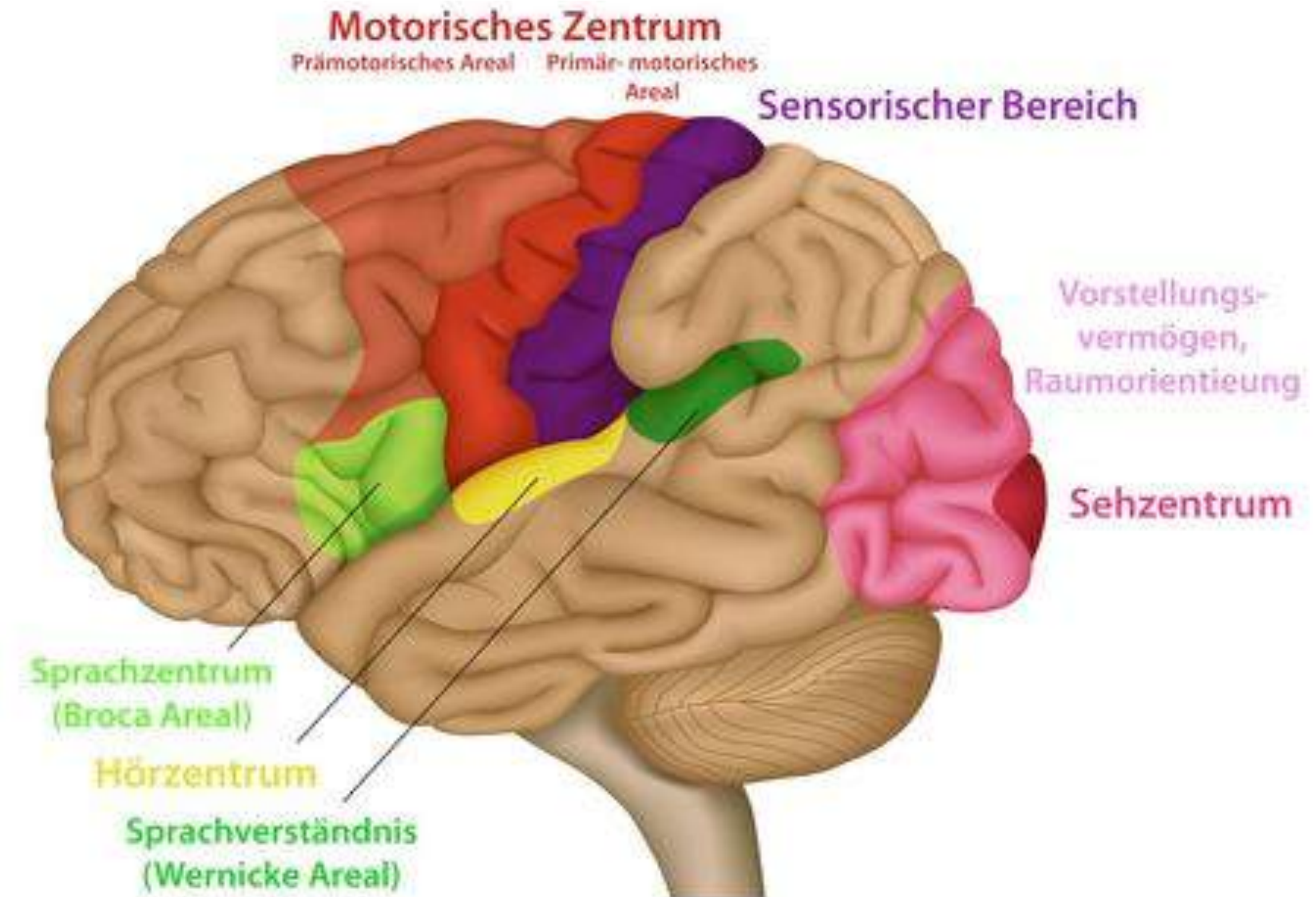
## Unterschiedliche Lernstile: Visuell, akustisch, kinästhetisch (VAK)





## Unterschiedliche Lernstile: Grundlage

- Auf den ersten Blick sind die Sinnesmodalitäten voneinander getrennt.
  - ▶ Ohren, Nase, Haut, Augen, ...
- ABER: Nur auf den ersten Blick. Eine genauere Betrachtung zeigt: Sie sind eng verknüpft.
- Sehen mit Hören, Sehen mit Tastsinn, Sehen mit Geschmack, etc.
- Evolutionär begründbar.



## Integration von Informationen - Der McGurk-Effect



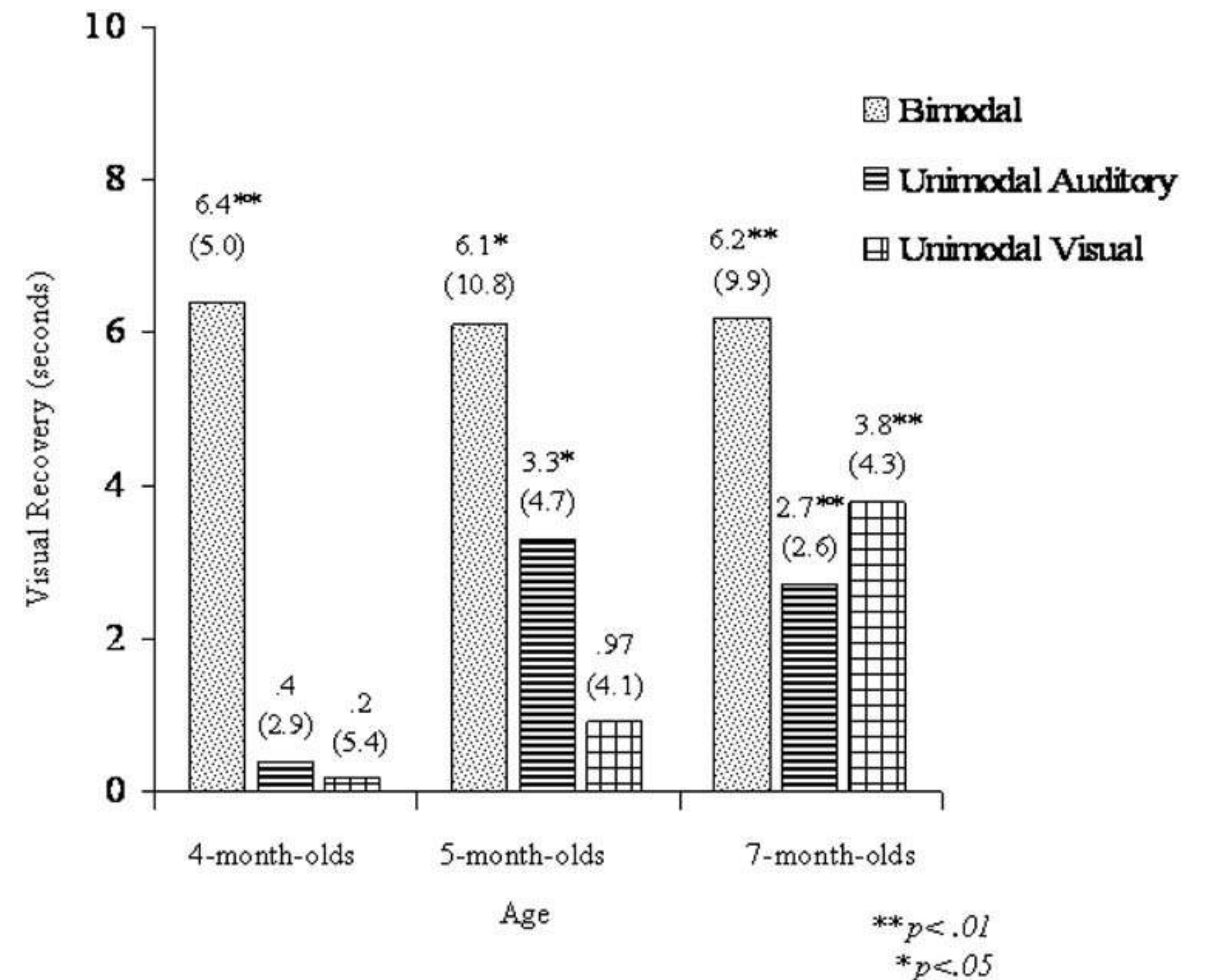
McGurk & MacDonald, 1976; <http://www.youtube.com/watch?v=G-IN8vWm3m0>





## Intersensory Redundancy Hypothesis

- Information unabhängig von aufnehmender Sinnesmodalität verarbeitet
  - ▶ Amodal
- Information die über mehrere Sinne aufgenommen
  - ▶ Multimodal
- Information über mehrere Sinne aufgenommen
  - ▶ Redundant
  - ▶ Salient
  - ▶ Wird als wichtiger wahrgenommen.

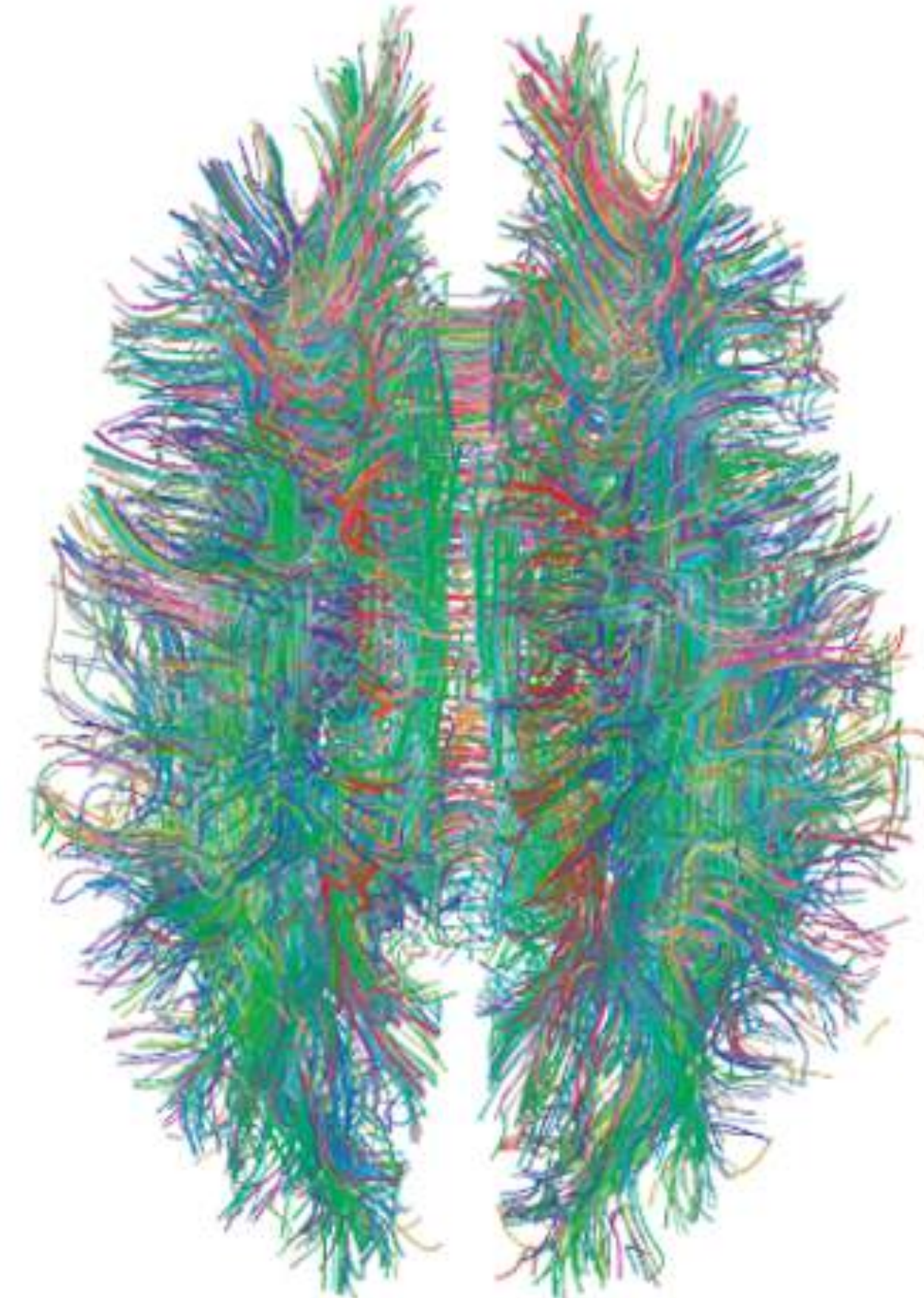


*Barrick & Lickliter, 2000; Flom & Bharick, 2007*



## Interkonnektivität des Gehirns

- „Having learned so much about hemispheric differences . . . it is now time to put the brain back together again.“  
(Hellige, 2000)
- „Human brain function and behaviour seem best explained on the basis of functional connectivity between brain structures rather than on the basis of localization of a given function to a specific brain structure.“  
(Walsh & Pascual-Leone, 2003, p. 206)



<https://en.wikipedia.org/wiki/Connectome>



## Wir verwenden nur 10% unseres Gehirns

- „As a rule, men habitually use only a small part of their powers which they actually possess.“  
(James, 1890)
- Übersetzung von Lowell Thomas: „Professor William James of Harvard used to say that the average person develops only ten per cent of his latent mental ability“.
- „Evolution does not produce excess, much less 90% excess. In the millions of studies of the brain, no one has ever found an unused portion of the brain.“  
(Beyerstein, 2004)



Überblick: <https://de.wikipedia.org/wiki/Zehn-Prozent-Mythos>



## Wir verwenden nur 10% unseres Gehirns

- Sauerstoff- und Nährstoffverbrauch des menschlichen Gehirns enorm kostspielig: Bis zu 20 % des gesamten Energieverbrauchs des Körpers, bei nur ca. 2 % der Körpermasse.
- Unwahrscheinlich, dass sich ein Organ mit so viel redundanter Masse überhaupt entwickelt hat.
- Falls doch: Bei 90 % überflüssiger Masse oder Funktion würde es einen Überlebensvorteil bedeuten, kleinere und effizientere Gehirne zu entwickeln. Die natürliche Selektion hätte die ineffizienten Gehirnareale beseitigt.



Überblick: <https://de.wikipedia.org/wiki/Zehn-Prozent-Mythos>





## The myth of ‚three‘ - Kritische Phasen in der Entwicklung

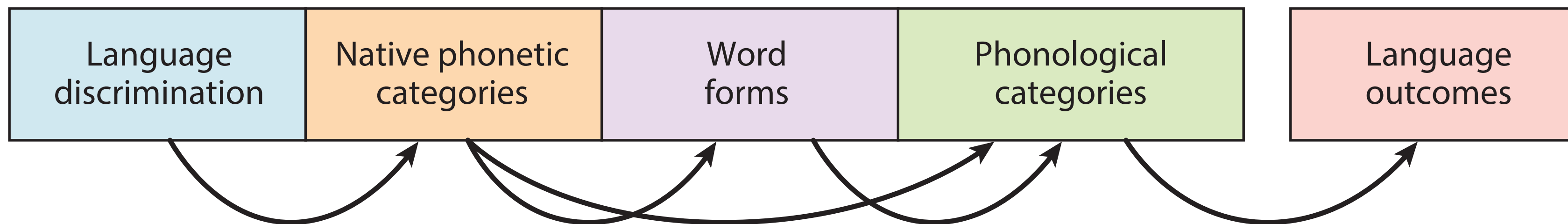
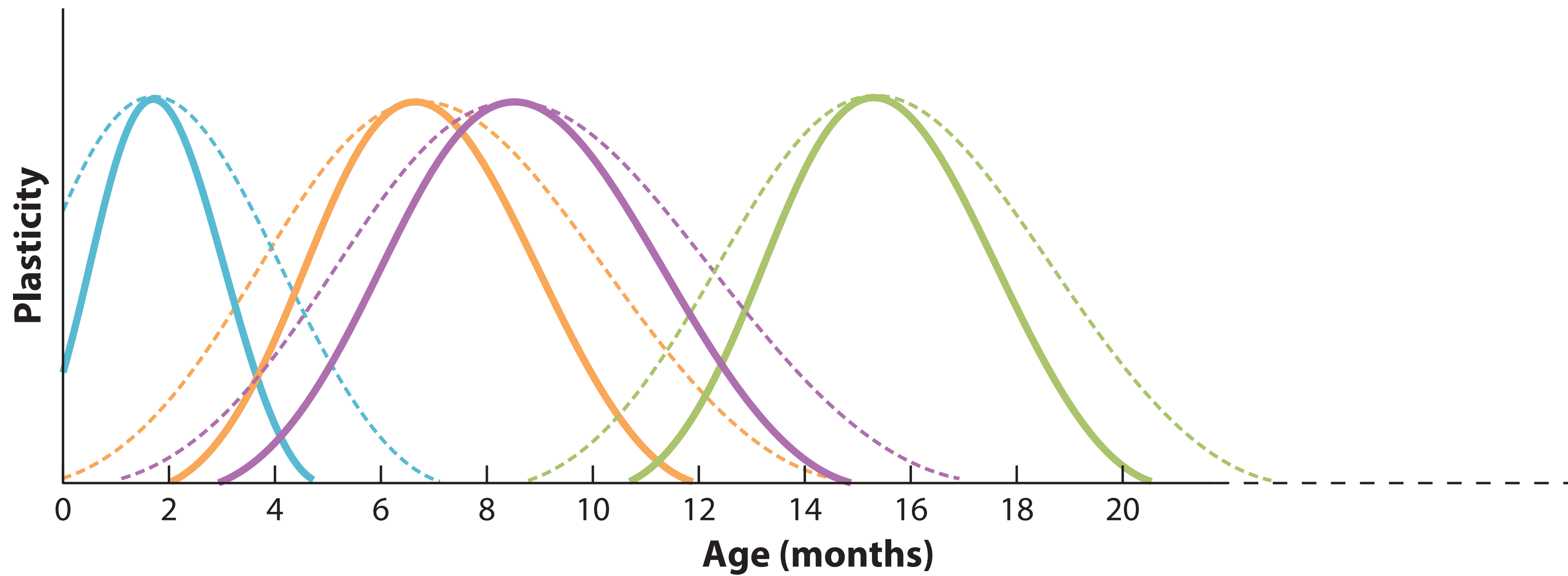
- **Mythos:** Der Zeitraum von 0 bis 3 Jahren ist eine kritische Phase in der menschlichen Entwicklung während der der Grossteil der Gehirnentwicklung vonstatten geht. Nach dieser Phase ist die Entwicklung des Menschen grösstenteils festgelegt.
- **Ursprung:** Sensitive Phasen (z. B. in der Sprachentwicklung) und die Feststellung, dass Kinder, die depriviert aufwachsen, gewisse Fähigkeiten nicht entwickeln.  
(e.g., *Blakemore & Frith, 2005*)



<https://topdocumentaryfilms.com/genie-secret-wild-child/>



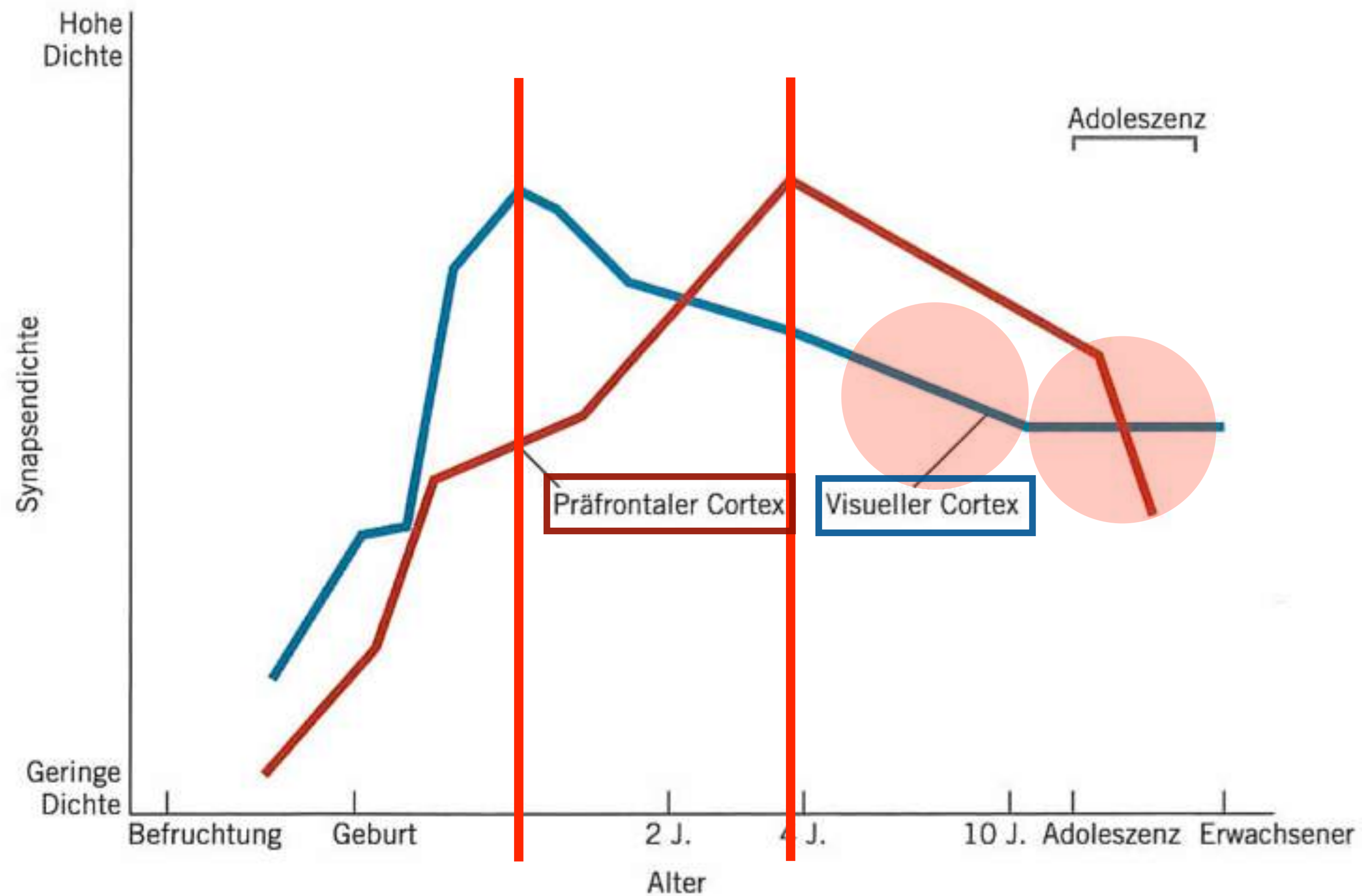
## The myth of ‚three’ - Kritische Phasen in der Entwicklung



Werker & Hensch, 2015



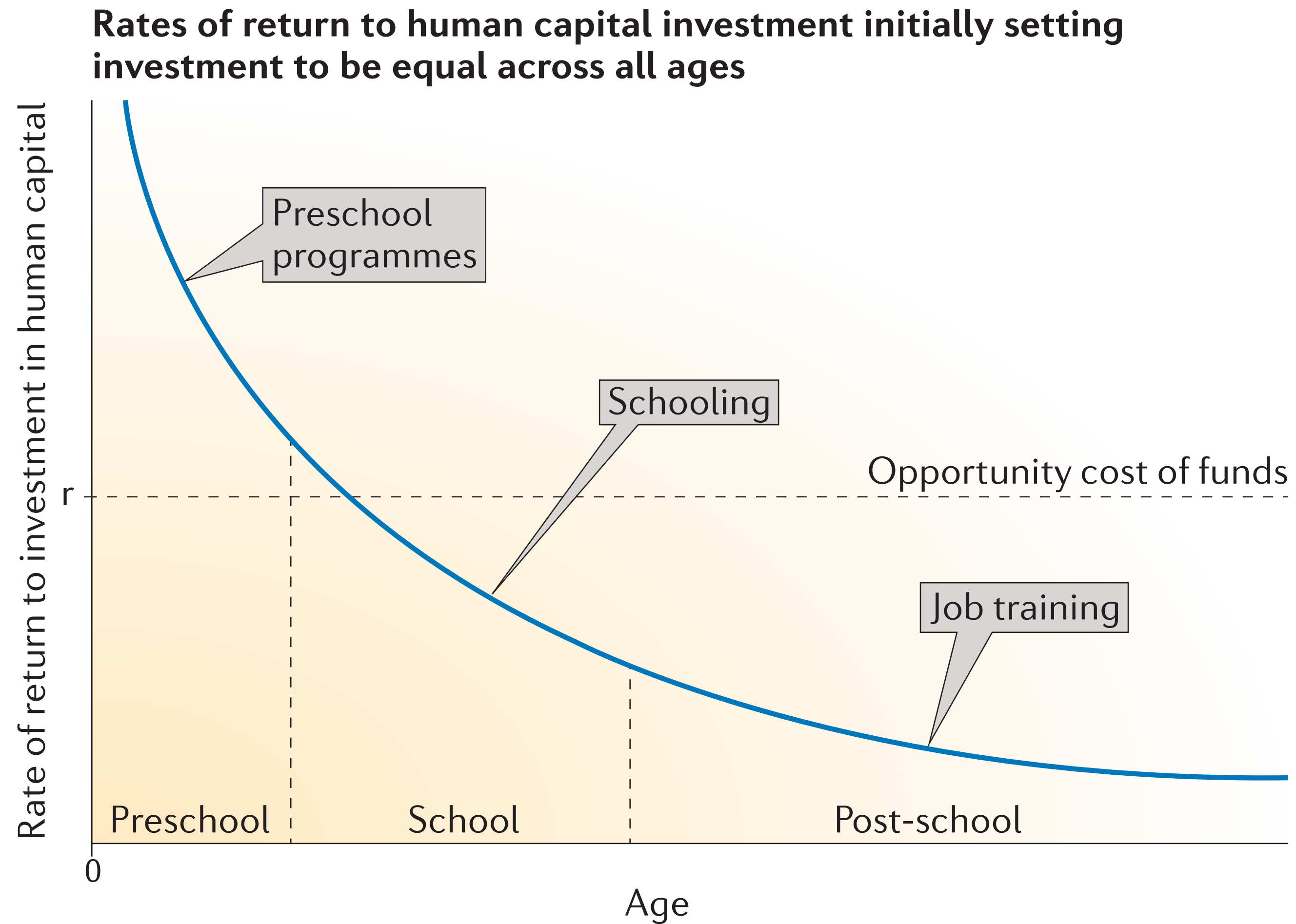
## The myth of ‚three’ - Kritische Phasen in der Entwicklung



aus Huttenlocher & Dabholkar, 1997



## The myth of 'three' - Kritische Phasen in der Entwicklung



*e.g., Heckman, 2008*



# Brain Gym®



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**Welcome to Brain Gym International**, a nonprofit 501(c)3 California corporation.

**Our Mission:**

Brain Gym® International is committed to the principle that moving with intention leads to optimal learning. Through our outstanding instructors and movement-based programs, we empower all ages to reclaim the joy of living.

**Mission Goals:**

We utilize the Brain Gym® educational model to:

- promote play and the joy of learning
- draw out and honor innate intelligence
- build awareness regarding the value of movement in daily life
- emphasize the ability to notice and respond to movement-based needs
- encourage self-responsibility
- leave each participant appreciated and valued



## Brain Gym®

### Brain Gym : Das Gehirn stärken

Die meisten Menschen, auch Kinder, bleiben meilenweit hinter ihren geistigen Möglichkeiten zurück. In einer Gesellschaft, die von Denken, von Ideen, von Kreativität und Phantasie lebt, sollten wir das ernst nehmen. Und wir sollten an unserer geistigen Leistungsfähigkeit verbessern, was auch immer in unserer Reichweite liegt.

Die wissenschaftlichen Zusammenhänge sind gut erforscht: Tägliches Jogging steigert die geistige Leistungsfähigkeit. Und das gilt natürlich auch für einige weitere sportliche Betätigungen.

Ursachen gibt es gleich mehrere von der Anregung der Nervenenden der Fußsohle über die Blutfettwerte (an denen man angeblich das Karrierepotential erkennen kann) bis hin zur optimalen Versorgung des Gehirns mit Sauerstoff und Nährstoffen. Auch die Entsorgung, die Beseitigung von Verbrennungsabfällen aus dem Gehirn, scheint eine wichtige Rolle zu spielen.





## Brain Gym®

In the Revised Teacher's Edition of Brain Gym®, Dennison & Dennison (1994) concluded with a section identifying which Brain Gym® exercises could be used to facilitate learning in a variety of academic areas: reading skills, oral reading, reading comprehension, thinking skills, spelling, math, penmanship, creative writing, clear listening and thinking, self-esteem, sports and play, memory, abstract thinking, creative thinking, speed reading, and test taking. Moreover, they claimed that Brain Gym® movements could improve activities such as keyboarding and riding in a car, bus, or plane; however, how such improvements would take place was not identified. Finally, the Brain Gym® home page ("Official Brain Gym® Web Site," 2005) heading reads "Learn ANYTHING Faster and More Easily," and the Web site bookstore includes books and articles touting the benefits of Brain Gym® for golf, sales, surfing, attention-deficit/hyperactivity disorder, emotional disturbance, fetal alcohol syndrome, learning disabilities, Alzheimer disease, salesmanship, sports, and senior moments. Although neither the theoretical foundation nor the peer-reviewed research base supported the claims of Brain Gym®, the slick marketing approach made it appear that Brain Gym® could provide the cure to all that ails humankind.

*Hyatt, 2007*

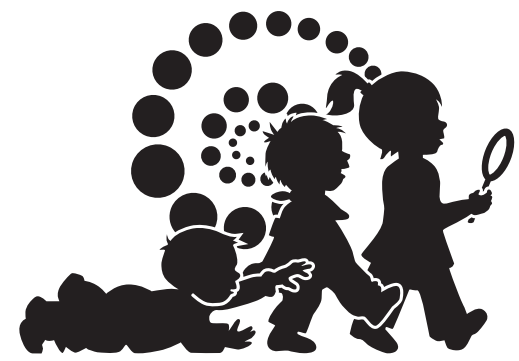


## Brain Gym®

Taken together, these studies clearly failed to support claims that Brain Gym® movements were effective interventions for academic learning. They were overcome by methodological difficulties, and two studies failed to address academic learning at all. With the exception of the studies reviewed in the previous section, the only other research reports located during the review were those listed on the Brain Gym® Web site and available for purchase. Two of those articles were published in peer-reviewed journals and have been discussed in the previous sections. One other was pub-

*Hyatt, 2007*





## Prävalenz von Neuromythen

Table 1 | Prevalence of neuromyths amongst practising teachers in five different international contexts

Myth*	Percentage of teachers who “agree” (rather than “disagree” or “don’t know”)				
	United Kingdom (n = 137)	The Netherlands (n = 105)	Turkey (n = 278)	Greece (n = 174)	China (n = 238)
We mostly only use 10% of our brain	48	46	50	43	59
Individuals learn better when they receive information in their preferred learning style (for example, visual, auditory or kinaesthetic)	93	96	97	96	97
Short bouts of co-ordination exercises can improve integration of left and right hemispheric brain function	88	82	72	60	84
Differences in hemispheric dominance (left brain or right brain) can help to explain individual differences amongst learners	91	86	79	74	71
Children are less attentive after sugary drinks and snacks	57	55	44	46	62
Drinking less than 6 to 8 glasses of water a day can cause the brain to shrink	29	16	25	11	5
Learning problems associated with developmental differences in brain function cannot be remediated by education	16	19	22	33	50

\*The table shows some of the most popular myths reported in four different studies from the United Kingdom<sup>1</sup>, The Netherlands<sup>1</sup>, Turkey<sup>4</sup>, Greece<sup>2</sup> and China<sup>7</sup>. In all studies, teachers were asked to indicate their levels of agreement with statements reflecting several popular myths, shown as “agree”, “don’t know” or “disagree”. The table shows the percentages of teachers within each sample who responded with “agree”.

*Howard-Jones, 2014*



## Prävalenz von Neuromythen

Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinesthetic).

Differences in hemispheric dominance (left brain, right brain) can help explain individual differences amongst learners.

Short bouts of co-ordination exercises can improve integration of left and right hemispheric brain function.

Exercises that rehearse co-ordination of motor-perception skills can improve literacy skills.

Environments that are rich in stimulus improve the brains of pre-school children.

Children are less attentive after consuming sugary drinks, and/or snacks.

It has been scientifically proven that fatty acid supplements (omega-3 and omega-6) have a positive effect on academic achievement.

There are critical periods in childhood after which certain things can no longer be learned.

We only use 10% of our brain.

Regular drinking of caffeinated drinks reduces alertness.

Children must acquire their native language before a second language is learned. If they do not do so neither language will be fully acquired.

Learning problems associated with developmental differences in brain function cannot be remediated by education.

If pupils do not drink sufficient amounts of water (=6–8 glasses a day) their brains shrink.

Extended rehearsal of some mental processes can change the shape and structure of some parts of the brain.

Individual learners show preferences for the mode in which they receive information (e.g., visual, auditory, kinesthetic).

	Incorrect		Correct		Do not know	
	UK (%)	NL (%)	UK (%)	NL (%)	UK (%)	NL (%)
Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinesthetic).	93	96	4	3	3	1
Differences in hemispheric dominance (left brain, right brain) can help explain individual differences amongst learners.	91	86	3	4	6	11
Short bouts of co-ordination exercises can improve integration of left and right hemispheric brain function.	88	82	0	5	12	13
Exercises that rehearse co-ordination of motor-perception skills can improve literacy skills.	78	63	3	11	19	27
Environments that are rich in stimulus improve the brains of pre-school children.	95	56	1	29	4	15
Children are less attentive after consuming sugary drinks, and/or snacks.	57	55	24	24	20	21
It has been scientifically proven that fatty acid supplements (omega-3 and omega-6) have a positive effect on academic achievement.	69	54	12	16	20	30
There are critical periods in childhood after which certain things can no longer be learned.	33	52	53	38	14	10
We only use 10% of our brain.	48	46	26	42	26	12
Regular drinking of caffeinated drinks reduces alertness.	26	36	39	41	35	23
Children must acquire their native language before a second language is learned. If they do not do so neither language will be fully acquired.	7	36	82	61	11	3
Learning problems associated with developmental differences in brain function cannot be remediated by education.	16	19	69	62	15	19
If pupils do not drink sufficient amounts of water (=6–8 glasses a day) their brains shrink.	29	16	46	49	26	35
Extended rehearsal of some mental processes can change the shape and structure of some parts of the brain.	6	14	69	58	26	28
Individual learners show preferences for the mode in which they receive information (e.g., visual, auditory, kinesthetic).	4	13	95	82	2	5

*Dekker et al., 2012*



## Warum halten sich diese Mythen so hartnäckig?

- Leicht verständlich.
- Stimmen mit Alltagsbeobachtungen überein.
- Stark propagiert und offensiv kommuniziert.
- Pro-Argument: Rechtfertigung ist pragmatisch, nicht empirisch. Wenn es etwas bringt (zu bringen scheint), dann ist es auch in Ordnung, es zu verwenden.
- Ursprung in validen Forschungsergebnissen. Allerdings werden diese dann oft überinterpretiert.
- Schwieriger Transfer von Forschungsergebnissen ins Klassenzimmer.

**“The first principle of being a good researcher is that you must not fool yourself, and you are the easiest person to fool”.**

Vielen Dank für Ihre Aufmerksamkeit

