Kognitionspsychologie II: Session 12

Q&A

Rui Mata, FS 2023

Version: May 23, 2023

Today

- Go over details about the exam and provide a couple of example questions
- Answer questions received over email

  Thank you to those who sent questions – please note I provide answers here rather than per email…

Kognitionspsychologie I & II

20 A-prim, 20 MC

FS 23 Propädeutische Klausur: Kognitionspsychologie I & II (23263)

Für die Beantwortung aller Fragen steht 120 Minuten Zeit zur Verfügung.

Wichtige formale Punkte:

- Sie erhalten zwei Dokumente – die Prüfungsfragen und einen separaten MC-Antwortbogen. Bitte prüfen Sie, dass die Variante der zwei Dokumente übereinstimmt (z.B. 2x"A")
- MC-Antwortbogen: Bitte tragen Sie Ihren Vornamen, Namen und die Matrikelnummer in die entsprechenden Felder ein. Die Matrikelnummer muss im Format XXXX-XXX-XXX eingetragen werden (z. B. 2021-045-089). Zusätzlich muss jede Matrikelnummerzahl in den numerischen Feldern angekreuzt werden.
- Fragebogen: Bitte notieren Sie Ihren Vornamen, Namen und die Matrikelnummer am oberen Rand der ersten Seite des Fragebogens. Schreiben Sie bitte leserlich.
- Bitte legen Sie nach der Prüfung sowohl den Frage- als auch den MC-Antwortbogen in den Umschlag – fehlt eines der beiden Dokumente gilt die Prüfung als nicht bestanden!
- Bitte den Umschlag nicht beschriften und nicht zukleben.

Allgemeines:

- Die Antworten müssen innerhalb der Prüfungszeit auf den Antwortbogen übertragen sein, indem Sie die entsprechenden Kästchen ankreuzen.
- Verwenden Sie nur die schwarzen Filzstifte, die Sie vor der Klausur erhalten.
- Auf dem Antwortbogen sind Korrekturen zu vermeiden (maschinelle Auswertung). Falls Korrekturen notwendig sind, malen Sie die falsch angekreuzten Felder voll aus und kreuzen Sie die richtigen Felder an.
- Es ist daher ratsam, die Lösungen zunächst auf dem Fragebogen zu markieren und dann zu übertragen. Es zählen jedoch nur die Lösungen auf dem Antwortbogen.
- Falls Sie ein geschwärztes Antwortkästchen doch wieder ankreuzen müssen, machen Sie das Kreuz bitte auf der rechten Seite des Kästchens inkl. eines kurzen Kommentars ganz rechts neben der Zeile, also nicht oberhalb oder unterhalb der Zeile

Anzahl und Typen der Klausurfragen:

Die Klausur enthält 40 Fragen, welche in zwei Fragetypen gegliedert sind. Bei den zwei Fragetypen kann maximal je ein Punkt erworben werden. Sie können also max. 40 Punkte erwerben.

Fragetyp A

- Jeweils genau eine der fünf Antwortalternativen ist richtig.
- Diese wird auf dem Antwortbogen markiert.
- Es kann nur richtig (ein Punkt) oder falsch (kein Punkt) beantwortet werden.

Fragetyp Multiple-Choice-Frage (Korrekte Antwortkombination)

- Bei diesem Fragetyp gibt es vier Antwortalternativen. Jede Antwortalternative kann korrekt oder falsch sein.
- Bei jeder Antwortalternative ist eine Auswahl zu treffen. Bitte kreuzen Sie ausschliesslich die korrekten Antwortoptionen an.
- Wenn die Markierung aller Antwortalternativen richtig ist, wird die Aufgabe mit einem Punkt gewertet. In allen anderen Fällen wir die Aufgabe mit Null Punkten bewertet.

Kognitionspsychologie II

20 A-prim, 20 MC

Sessions 1-10 of **Kognitionspsychologie II** are equally covered…

#	Date	Topic	Slides
1	02.03.2021	Session 1: Introduction	pdf
2	09.03.2021	Session 2: What is intelligence?	pdf
3	16.03.2021	Session 3: Intelligence: Nature & Nurture	pdf
4	23.03.2021	Session 4: Space	pdf
5	30.03.2021	Session 5: Number	pdf
6	06.04.2021	Session 6: Language	pdf
7	13.04.2021	Session 7: Facts	pdf
8	20.04.2021	Session 8: Emotion	pdf
9	27.04.2021	Session 9: Motivation	pdf
10	04.05.2021	Session 10: Consciousness	pdf
11	11.05.2021	Session 11: What's next?	pdf
12	18.05.2021	Session 12: Q&A	pdf
13	25.05.2021	Exam	

A	MC
1	1
1	1
1	1
1	1
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1	1
1	1
1	1
10	**10**

Kognitionspsychologie II

Example questions

A

Identify the CORRECT statement

A) By convention, about 30% of individuals have an IQ between 85 and 115.
B) Meta-analytic evidence suggests that the correlation between intelligence and job performance is sizable ($r \approx .5$).
C) The correlation between different measurements of *g* of the same individuals using different intelligence batteries is typically small ($r \approx .2$).
D) The more IQ deviates from 100, the more people can be found with similar IQ values.
E) Spearman suggested that *g* is a statistical artifact because every intelligence test taps into different capacities, which can lead to a negative manifold captured by statistical procedures, such as factor analysis.

MC

Which of the following statements is/are correct?

A) Connectionist models are typically implemented as computer programs that simulate cognition through the flow of activation among simple, neuron-like processing units linked to each other through weighted connections.
B) Temporal lobe lesions such as those suffered by patient H.M. tend to lead mostly to deficits in short-term memory.
C) Semantic dementia is usually associated with semantic knowledge deficits as revealed through naming or other non-verbal tests, and typically results from damage to the anterior frontal lobe.
D) According to the hub-and-spokes model of semantic cognition, the lesion of modality-specific components often leads to general semantic deficits.

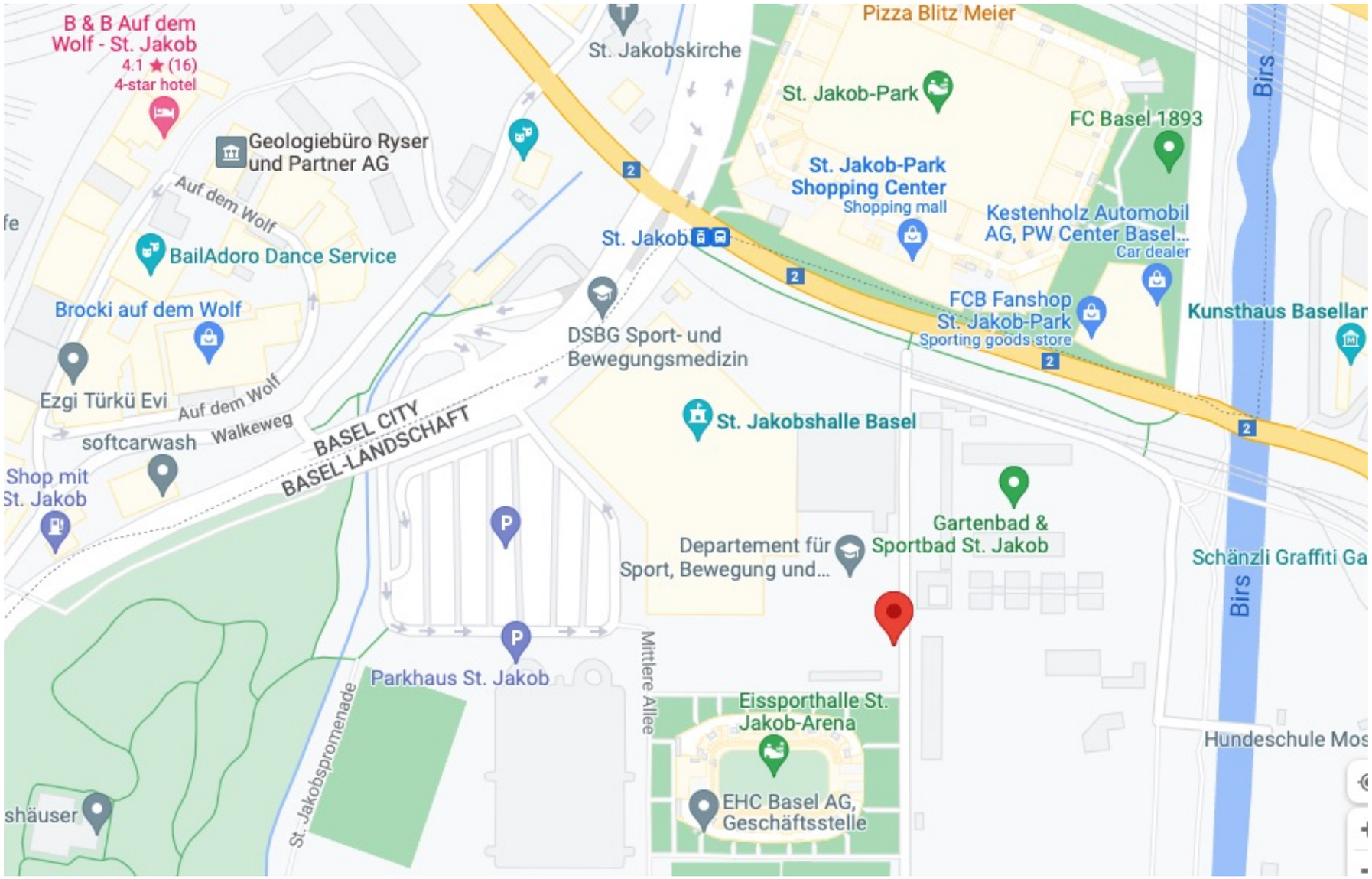
Kognitionspsychologie II

Additional information

- Questions do not ask about years or dates, these sometimes can be given to provide context (e.g., Smith et al., 1990).
- Questions may ask about specific statements concerning theories and/or authors that may be can be correct/incorrect (e.g., "Chomsky used the poverty of the stimulus argument to support the usage-based learning theory of language")
- 24 points (60%) needed for a pass
- Kognitionspsychologie II questions are in English (Kognitionspsychologie I are in German)
- You can bring a dictionary

Exam @ Departement für Sport, Bewegung und Gesundheit (DSBG)

Dienstag 06.06.2023	08.00-10.00 Uhr	Propä-Prüfung DSBG, Sporthalle 1



After the exam

- Studiendekanat should forward evaluation questionnaire about the exam over email
- Exam inspection (Einsicht), Tuesday, July 4th, 9:00

Preparation: (Self)-testing and elaboration work best…

Table 4. Utility Assessment and Ratings of Generalizability for Each of the Learning Techniques

Technique	Utility	Learners	Materials	Criterion tasks	Issues for implementation	Educational contexts
Elaborative interrogation	Moderate	P-I	P	I	P	I
Self-explanation	Moderate	P-I	P	P-I	Q	I
Summarization	Low	Q	P-I	Q	Q	I
Highlighting	Low	Q	Q	N	P	N
The keyword mnemonic	Low	Q	Q	Q-I	Q	Q-I
Imagery use for text learning	Low	Q	Q	Q-I	P	I
Rereading	Low	I	P	Q-I	P	I
Practice testing	High	P-I	P	P	P	P
Distributed practice	High	P-I	P	P-I	P	P-I
Interleaved practice	Moderate	I	Q	P-I	P	P-I

Note: A positive (P) rating indicates that available evidence demonstrates efficacy of a learning technique with respect to a given variable or issue. A negative (N) rating indicates that a technique is largely ineffective for a given variable. A qualified (Q) rating indicates that the technique yielded positive effects under some conditions (or in some groups) but not others. An insufficient (I) rating indicates that there is insufficient evidence to support a definitive assessment for one or more factors for a given variable or issue.

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. *Psychological Science in the Public Interest*, *14*(1), 4–58. http://doi.org/10.1177/1529100612453266

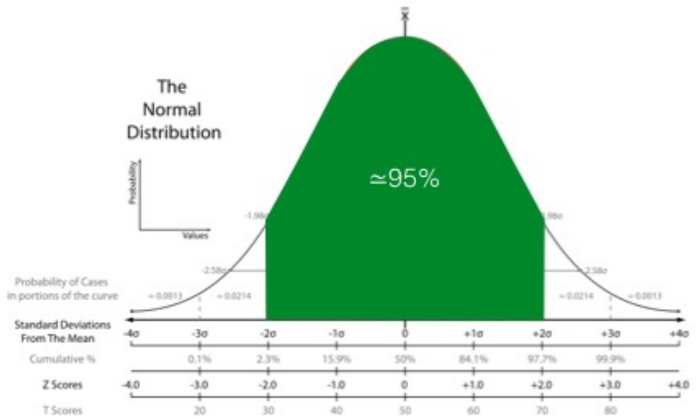
Preparation: (Self)-testing and elaboration work best…

slides + **readings**

The Psychometric Approach to Intelligence

Intelligence (as IQ) is a relative statement

"without variation in mental abilities there would be no latent variables—the last survivor of a meteor collision with Earth would still have cognitive abilities and mental limitations but would not have g." (Kovacs & Conway, 2016, p. 153)



The distribution of test results is standardized as having a mean of 100 and a standard deviation of 15. Consequently, about 2/3 of the population have an IQ between 85 and 115. The larger the distance from 100, the fewer individuals can be found with a given IQ.

http://de.wikipedia.org/wiki/Intelligenzquotient

$$IQ = 100 + 15 \times \frac{\text{Raw score - Mean}}{\text{Standard Deviation}}$$

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Opinion

Network Neuroscience Theory of Human Intelligence

Aron K. Barbey[1,2,3,4,5,6,*,@]

An enduring aim of research in the psychological and brain sciences is to understand the nature of individual differences in human intelligence, examining the stunning breadth and diversity of intellectual abilities and the remarkable neurobiological mechanisms from which they arise. This Opinion article surveys recent neuroscience evidence to elucidate how general intelligence, *g*, emerges from individual differences in the network architecture of the human brain. The reviewed findings motivate new insights about how network topology and dynamics account for individual differences in *g*, represented by the Network Neuroscience Theory. According to this framework, *g* emerges from the small-world topology of brain networks and the dynamic reorganization of its community structure in the service of system-wide flexibility and adaptation.

Trends

Accumulating evidence from network neuroscience indicates that *g* depends on the dynamic reorganization of brain networks, modifying their topology and community structure in the service of system-wide flexibility and adaptation.

Whereas crystallized intelligence engages easy-to-reach network states that access prior knowledge and experience, fluid intelligence recruits difficult-to-reach network states that support cognitive flexibility and adaptive problem-solving.

The capacity to flexibly transition between networks states therefore provides the basis for *g* – enabling rapid information exchange across networks and capturing individual differences in information processing at a global level.

This framework sets the stage for new approaches to understanding the neural foundations of *g*, examining individual differences in brain network topology and dynamics.

Spearman's Enigmatic *g*

Research in the psychological and brain sciences has long sought to understand the nature of individual differences in human intelligence, examining the stunning breadth and diversity of intellectual abilities and the remarkable cognitive and neurobiological mechanisms from which they emerge. The foundations of modern research in this effort were established in the early 20th century by Charles Spearman, who developed the correlation method and applied this technique to examine academic achievement within four branches of school study (i.e., English, French, classics, and mathematics) [1,2].

Spearman discovered that correlations in performance reflected characteristics of each discipline, observing that 'English and French, for instance, agree with one another in having a higher correlation with Classics than with Mathematics' [1]. Evidence that all branches of school study were not equally correlated motivated Spearman to conclude that they were influenced, in part, by mental abilities that were specific to each discipline. Beyond identifying the contribution of specific mental abilities, Spearman observed that the correlations among the four branches of school study were always positive. This finding, which is now well-established and named the positive manifold, provided evidence that all cognitive tests measure something in common. Spearman referred to this commonality as the general factor, *g*, which represents the component of individual differences variance that is common across all tests of mental ability.

These early findings motivated Spearman's two-factor model which held that performance on tests of mental ability jointly reflect (i) a specific factor, *s*, that is unique to each test, and (ii) a general factor, *g*, that is common across all tests [1,2]. Contemporary research has further elaborated Spearman's model to include an intermediate level of broad abilities that account for the variance that is shared across similar domains of cognitive ability. For example, the well-established Cattell–Horn–Carroll theory distinguishes between performance on tests of prior knowledge and experience, referred to as crystallized intelligence, from those that require

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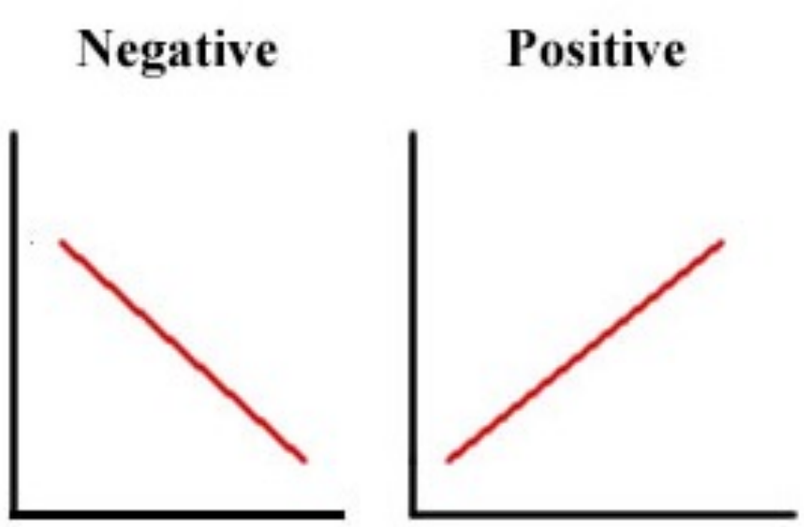
[6]https://www.DecisionNeuroscienceLab.org
[@]Twitter: @DecisionNeurosc
*Correspondence: barbey@illinois.edu (A.K. Barbey).

Questions

Are Numbers labeled as “medium-sized correlations” positive or negative effects?



Questions

Session 1:

•How can Aristotle's four causes be related to Marr and Tinbergen's suggestions? Can the levels also be compared?

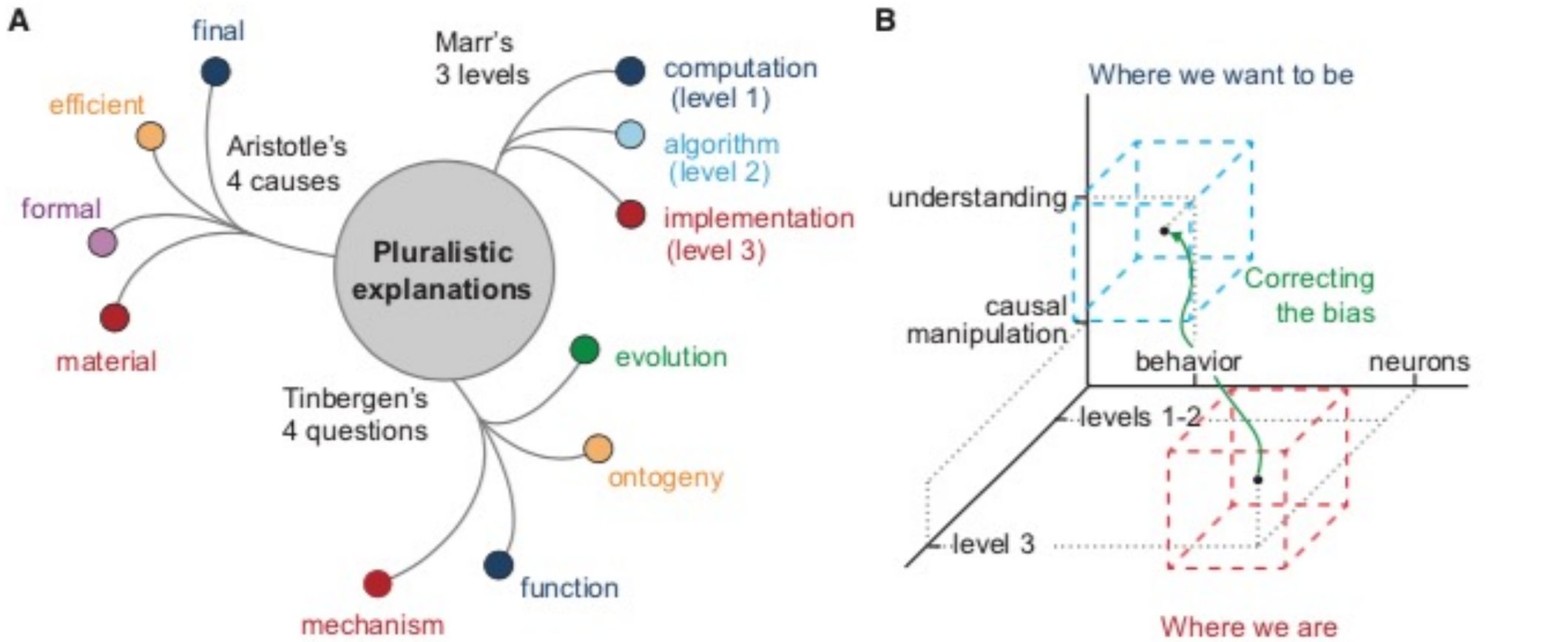


Figure 4. The Future History of Pluralistic Explanation

(A) That understanding of a phenomenon is multidimensional has long been appreciated. Aristotle posited four kinds of explanation: to explain ''why'' something changes, a polyhedric notion of causality is necessary; one that includes not only the material cause (what it is made out of), but also the other three ''whys'': formal (what it is to be), efficient (what produces it), and final (what it is for). Tinbergen also devised four questions about behavior: to go beyond its proximate causation (mechanism) to also considering its evolution, development, and real-world function. Marr's three levels are also shown.

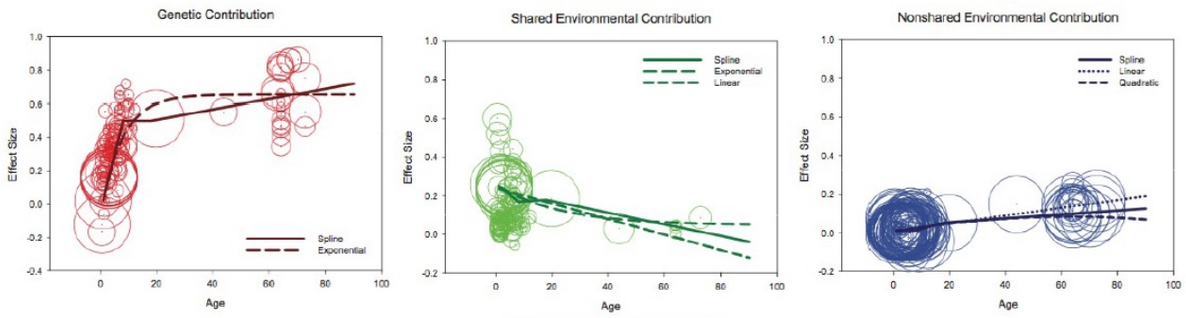
(B) Three-dimensional space with axes of understanding-manipulation, behavior-neurons, and Marr's levels. The red box is where we are and the blue is where we should be.

Questions

I was reviewing session 3 of Kognitionspsychologie II. I tried to understand the graph on slide 21 and couldn't find a possible solution in my mind (concerning the blue marked part and the two right graphics). Afterwards I checked the paper and found a second graphic. I think the blue marked text suits better (especially shared environment and nonshared environment) to the following image.
Am I putting something wrong together or was the description meant for those graphics?

Environmentality

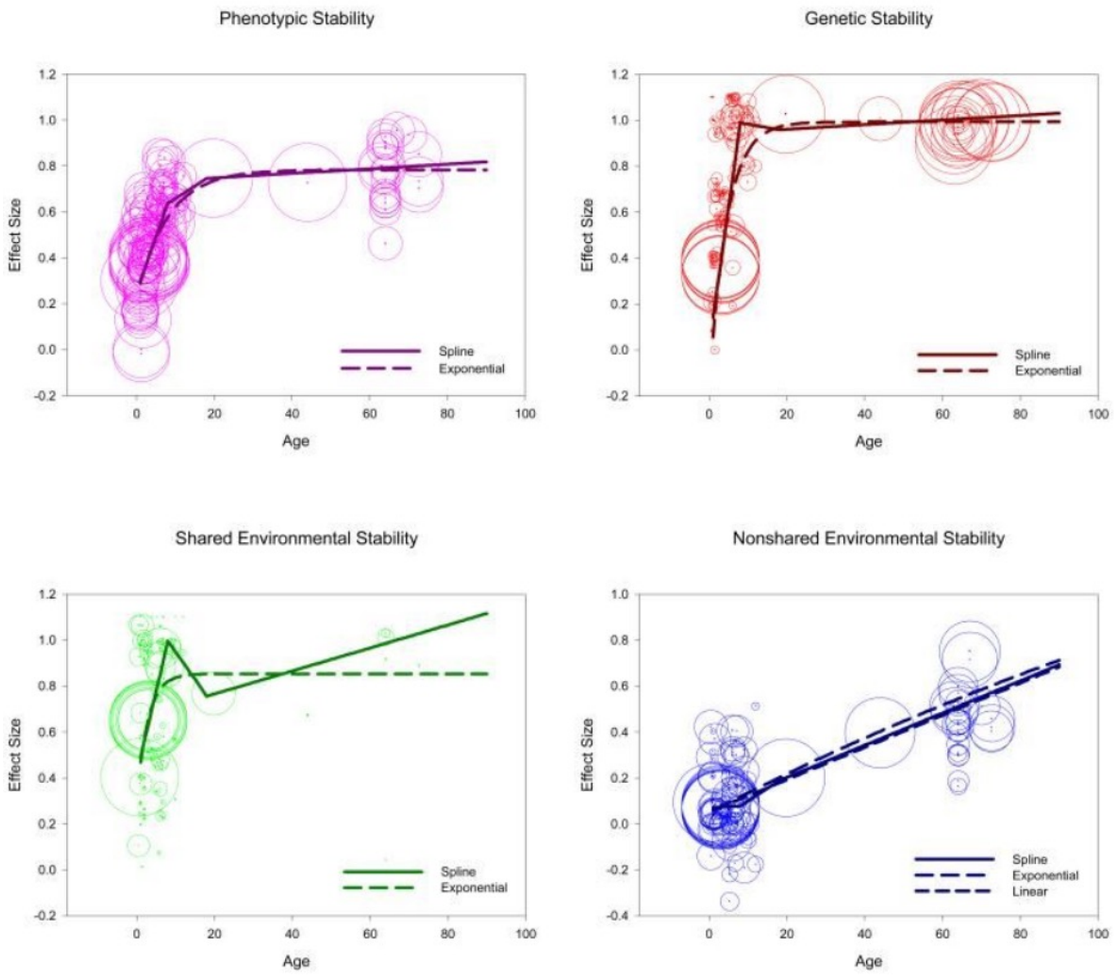
Heritability is not constant across the life span!



Tucker-Drop and Briley meta-analysed 15 longitudinal samples, involving monozygotic twin pairs raised together, dizygotic twin pairs raised together, monozygotic twin pairs raised apart, dizygotic twin pairs raised apart, adoptive sibling pairs, and nonadoptive sibling pairs, ranging in age from infancy through late adulthood.

"Cross-time correlations for genetic and shared environmental components were, respectively, low and moderate during early childhood, increased sharply over child development, and remained high from adolescence through late adulthood. Cross-time correlations for nonshared environmental components were low across childhood and gradually increased to moderate magnitudes in adulthood. "

Tucker-Drob, E. M., & Briley, D. A. (2014). Continuity of genetic and environmental influences on cognition across the life span: A meta-analysis of longitudinal twin and adoption studies. ***Psychological Bulletin, 140***(4), 949–979. 21



The text refers to the stability of the components rather than their contribution to the phenotype. A better description would have been: Genetic contribution to phenotypic variation starts low but increases considerably across the life span, shared environment is initially small and further decreases across the life span, and nonshared/unique environmental contribution is overall small but increases somewhat across the life span.

Questions

Session 3:
Can you explain Falconer's Formula again. Can you use it to estimate heritability?

Estimating heritability from familial studies

Familial studies use a subtraction logic…

Formula	explanation
$A = 2 (r_{MZ} - r_{DZ})$ Falconer's formula	MZs and DZs differ by half a genome, consequently the difference in the similarities between MZs (quantified by r_{mz}) and DZs (quantified by r_{dz}) that is determined by genetics is half a genome. In numbers: half of a genome explains ½ A = .86 - .60 = .26 of the variance, and, therefore, a whole genome explains, A = 2 × .26 = **.52** of the variance.
$C = r_{mz} - A$	MZs similarities (quantified by r_{mz}) are due to both 100% shared genetic material and their shared common environment, consequently, subtracting the similarity due to genetics (A) leads to an estimate of the similarity due to the common environment. In numbers, C = .86 - .52 = **.34**
$E = 1 - r_{mz}$	The unique environment (E) is responsible for the observed differences between MZs because they share 100% of genetics and common upbringing. In numbers, E = 1 - .86 = **.14**

Note that the numbers in **bold** are a ballpark estimate based on part of the data of Bouchard and McGue (1981). More recent meta-analytic results and slightly different methods, produce quite similar but somewhat different estimates (cf. Polderman et al., 2015).

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Questions

Session 3:
According to Kendler (heritability is not constant across cohorts), heritability is higher in a permissive environment than in a restrictive environment. I do not fully understand this. After all, if the environment is more restrictive, one is exposed to fewer environmental factors, so I think it should lead to higher heritability (variance is more due to genotype). Is my reasoning wrong?

Environmentality

Heritability is not constant across cohorts!

Table 2. Selected Studies Suggesting Changing Heritability of Behavioral Traits in Different Environments

Source, y	Measure	Sample	Environmental Variable	Results
Heath et al,[31] 1985	Years of education	Male twins from Norwegian Twin Registry	Pre– vs post–World War II historical cohort	Higher heritability in more recent cohorts where school advancement more merit based
Heath et al,[32] 1989	Alcohol consumption	Twins from Australian Registry	Martial status	Greater heritability in single vs married individuals
Fishbein et al,[33] 1990	Reading and math achievement	Swedish twin school children	Permissive vs restrictive class	Higher heritability in permissive vs restrictive class
Lichtenstein et al,[34] 1992	Educational achievement	Swedish twins raised together and apart	Historical cohort	Higher heritability in those <60 vs >60 years of age
Dunne et al,[35] 1997	Age at first intercourse	Australian Twin Registry	Historical cohort	Greater heritability in more recent cohorts
Rowe et al,[36] 1999	Aggression	US adolescent twins and siblings	Family warmth	Greater heritability in schools with higher mean family warmth
Boomsma et al,[37] 1999	Disinhibition	Dutch adolescent twins	Religious upbringing	Higher heritability in those with a nonreligious vs religious upbringing
Rowe et al,[36] 1999	Vocabulary IQ	US adolescent twins and siblings	Parental education	Greater heritability in more highly educated families
Kendler et al,[38] 2000	Regular tobacco use	Female-female Swedish twins reared together and apart	Historical cohort	Greater heritability in more recent cohorts with higher levels of tobacco use

Heritability estimates can vary across cohorts because environmental effects and variance in the trait differ or change across populations and historical periods. Many of the results above may be explained by the idea that higher heritability is found in environments that provide a greater diversity of exposures…

Kendler, K. S. (2001). Twin studies of psychiatric illness: An update. ***Archives of General Psychiatry, 58***(11), 1005–1014.

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"In fact, research on how the heritability of cognition differs across development and across context suggests that *genetic influences on cognition are maximized by environmental opportunity*. The highest heritability estimates are obtained for older children and adolescents from economically advantaged homes—that is, among children who have the autonomy to select environmental experiences consistent with their own interests and who have an array of high-quality experiences to choose from."
Tucker-Drob, Briley, & Harden (2013)

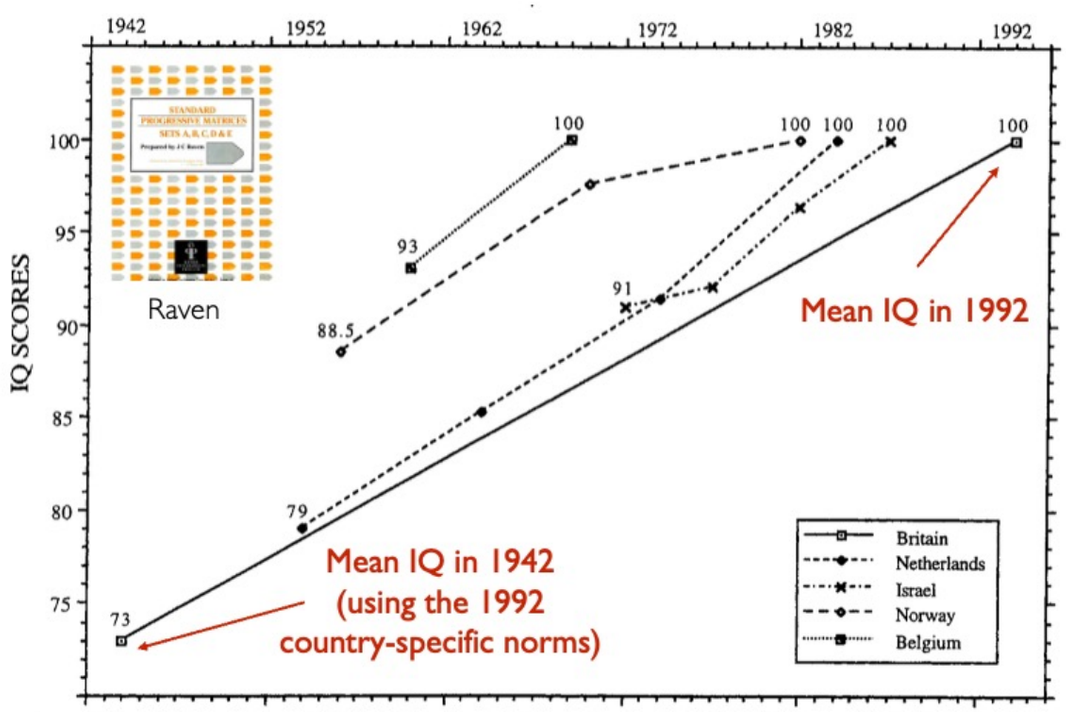
Questions

Session 3:
Flinn Effect: How and on which cohorts is the Flynn effect measured? Is it measured several times with the same individuals or always on different cohorts? I don't quite understand the graph on p. 18 in the slides.

Environmentality

Intelligence can change across cohorts (Flynn effect)

The Flynn effect is the substantial and long-sustained increase in both fluid and crystallized intelligence test scores measured in many parts of the world from roughly 1940s to the present day. When IQ tests are initially standardized using a sample of test-takers, by convention the average of the test results is set to 100 and their standard deviation is set to 15. When IQ tests are revised, they are again standardized using a new sample of test-takers, usually born more recently than the first. Again, the average result is set to 100. However, when the new test subjects take the older tests, their average scores are typically above 100.



Flynn, J. R. (1999). Searching for justice: The discovery of IQ gains over time. ***American Psychologist***, 54, 5-20.

The most comprehensive meta-analysis of the Flynn effect to date (k = 285, *N* = 14,031), suggest an average effect of ca. 2 IQ points per decade:
Trahan, L. H., Stuebing, K. K., Fletcher, J. M., & Hiscock, M. (2014). The Flynn effect: A meta-analysis. ***Psychological Bulletin, 140***(5), 1332–1360. doi:10.1037/a0037173

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Questions

On Slide 15 of session four, there are two different sayings about where the dorsal stream leads to. The side note says “posterior parietal cortex” and the bigger text says “inferior parietal areas” Is that a mistake or are both correct? Because for the ventral stream, both is inferior.

Object representation: Two Visual Pathways

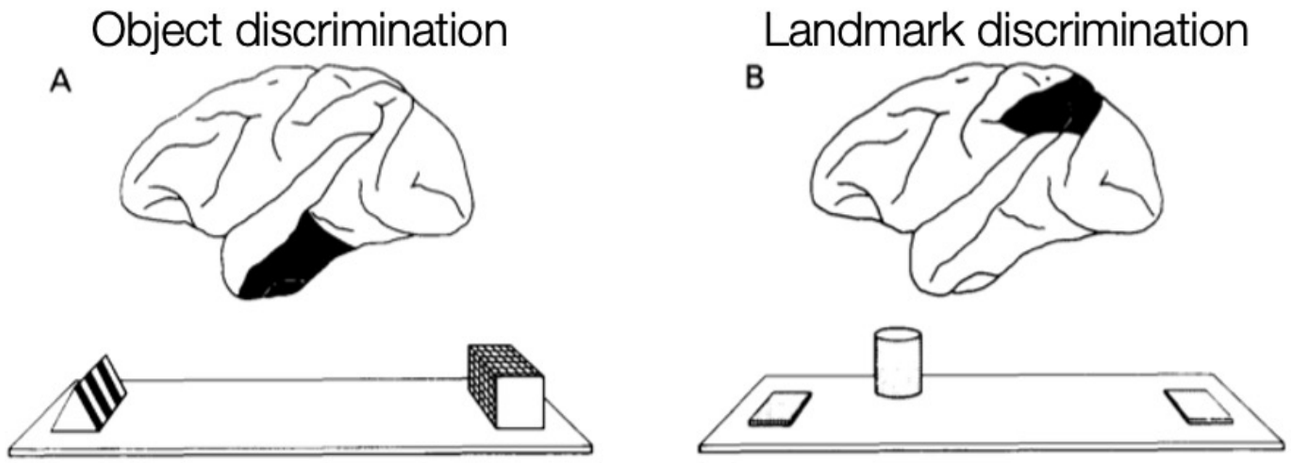
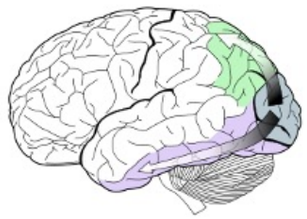


Fig. 2. *Behavioral tasks sensitive to cortical visual lesions in monkeys.* **(A)** *Object discrimination. Bilateral removal of area TE in inferior temporal cortex produces severe impairment on object discrimination. A simple version of such a discrimination is a one-trial object-recognition task based on the principle of non-matching to sample, in which monkeys are first familiarized with one object of a pair in a central location (familiarization trial not shown) and are then rewarded in the choice test for selecting the unfamiliar object.* **(B)** *Landmark discrimination. Bilateral removal of posterior parietal cortex produces severe impairment on landmark discrimination. On this task, monkeys are rewarded for choosing the covered foodwell closer to a tall cylinder, the 'landmark', which is positioned randomly from trial to trial closer to the left cover or closer to the right cover, the two covers being otherwise identical.*

“Evidence is reviewed indicating that striate cortex in the monkey is the source of two multisynaptic corticocortical pathways. One courses ventrally, interconnecting the striate, prestriate, and inferior temporal areas, and enables the visual identification of objects. The other runs dorsally, interconnecting the striate, prestriate, and inferior parietal areas, and allows instead the visual location of objects. How the information carried in these two separate pathways is reintegrated has become an important question for future research.”

Mishkin, M. , Ungerleider, L. G., & Macko, K. A. (1983). Object vision and spatial vision: Two cortical pathways. ***Trends in Neurosciences, 6***, 414-417.



Ventral System/Stream

Leads from V1 to the inferior temporal cortex: “what” pathway, associated with recognition and object representation.

Dorsal System/Stream

Lead from V1 to the posterior parietal cortex: “where” pathway, associated with movement and the representation of location of objects, particularly when actions are involved.

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Questions

Session 4:
Can you explain again the Temporo-parietal model of spatial memory and imagery?

Temporo-parietal model of spatial memory and imagery

Egocentric (self to object)

Represents the location of objects in space relative to the body axes of the self

Allocentric (object to object)

Represents the location of objects in space relative to other objects.

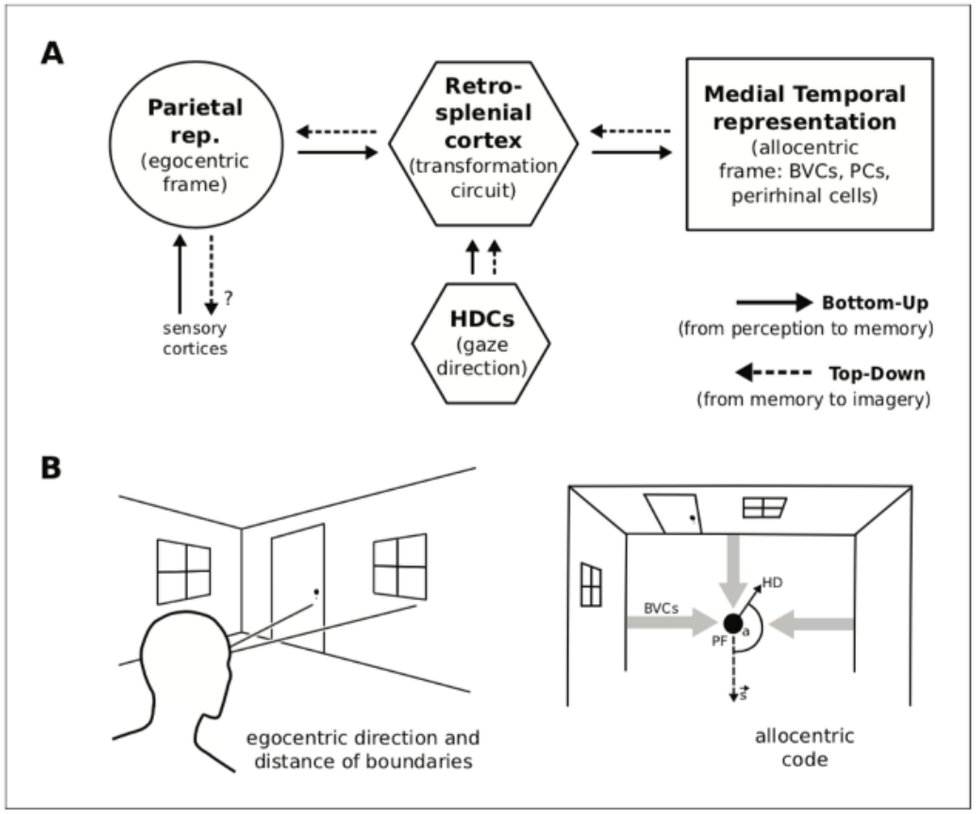

Figure 1. (A) Processed sensory inputs reach parietal areas and support an egocentric representation of the local environment (in a head-centered frame of reference). Retrosplenial cortex uses current head or gaze direction to perform the transformation from egocentric to allocentric coding. At a given location, environmental layout is represented as an allocentric code by activity in a set of boundary vector cells (BVCs), the place cells (PCs) corresponding to the location, and perirhinal neurons representing boundary identities (in a familiar environment, all these representations are associated via Hebbian learning to form an attractor network). Black arrows indicate the flow of information during perception and memory encoding (bottom-up). Dotted arrows indicate the reverse flow of information, reconstructing the parietal representation from view-point invariant memory (imagery, top-down). (B) Illustration of the egocentric (left panel) and allocentric frame of reference (right panel), where the vector s indicates South (an arbitrary reference direction) and the angle a is coded for by head direction cells, which modulate the transformation circuit. This allows BVCs and PCs to code for location within a given environmental layout irrespective of the agent's head direction (HD). The place field (PF, black circle) of an example PC is shown together with possible BVC inputs driving the PC (broad grey arrows).

Bicanski, A., & Burgess, N. (2018). A neural-level model of spatial memory and imagery. ***Elife***, ***7***. http://doi.org/10.7554/eLife.33752

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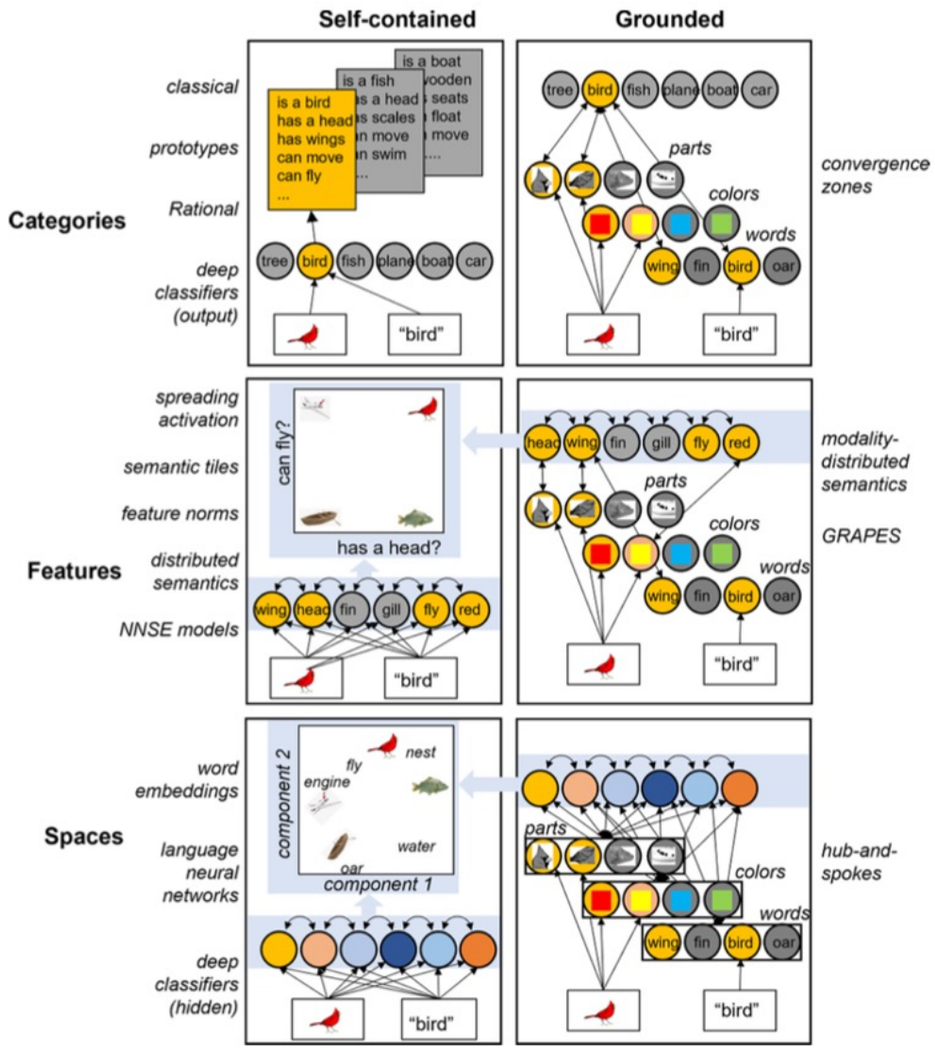
Questions

Session 7:
Can you explain again the slide "Computational Hypotheses about semantic representations". (p.23)

The Neural Basis of Semantic Representations: Hub-and-spokes model

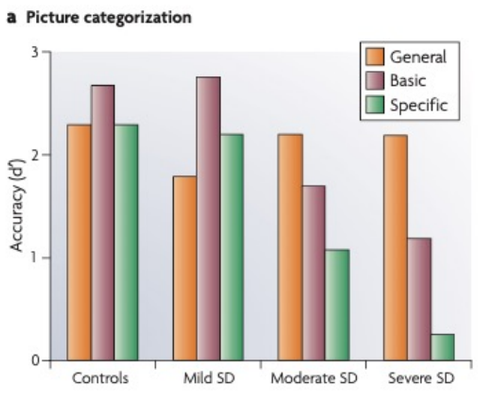


Computational hypotheses about semantic representation. Three ways in which conceptual structure could be encoded. First, information may be encoded in discrete, independent category representations (top row). On this view, sensory inputs recruit discrete and independent category representations which either encapsulate semantic information within themselves or connect and bind modality-specific surface representations encoding characteristics of category members (top right). Second, semantic information may be distributed across independent and interpretable semantic feature representations, with featural overlap indicating conceptual similarity (middle). Features may independently and intrinsically encode the presence of stipulated semantic features within a concept (middle left) or gain meaning via connection to surface representations that directly encode such information (middle right). Third, semantic information may be encoded by a continuous distributed representation space that expresses conceptual similarities among items even though its dimensions are not independently interpretable (bottom). Semantic information may be self-contained by the distances encoded in such a space (bottom left) or grounded via mappings from the space to modality-specific surface representations of specific properties (bottom right). Black arrows illustrate how information flows through the network given the stimuli shown. Text on either side indicates well-known perspectives in the literature that characterize each view. For feature-based and vector space representations, representational spaces are schematized on a blue background. Blue arrows point to the type of representational similarity structure encoded by the corresponding layers. Abbreviations: GRAPES, grounding representations in action, perception, and emotion systems; NNSE, non-negative sparse embeddings.

Frisby, S. L., Halai, A. D., Cox, C. R., Lambon Ralph, M. A., & Rogers, T. T. (2023). Decoding semantic representations in mind and brain. Trends in Cognitive Sciences, S1364661322003230. https://doi.org/10.1016/j.tics.2022.12.006 **23**

Questions

I have a question regarding semantic dementia: How can one diagnose semantic dementia? Which tests are used? Can one use non-verbal tests to diagnose it or do they have to be verbal.



b Picture naming

Item	Sept 1991	Mar 1992	Sept 1992	Mar 1993
Bird	+	+	+	Animal
Chicken	+	+	Bird	Animal
Duck	+	Bird	Bird	Dog
Swan	+	Bird	Bird	Animal
Eagle	Duck	Bird	Bird	Horse
Ostrich	Swan	Bird	Cat	Animal
Peacock	Duck	Bird	Cat	Vehicle
Penguin	Duck	Bird	Cat	Part of animal
Rooster	Chicken	Chicken	Bird	Dog

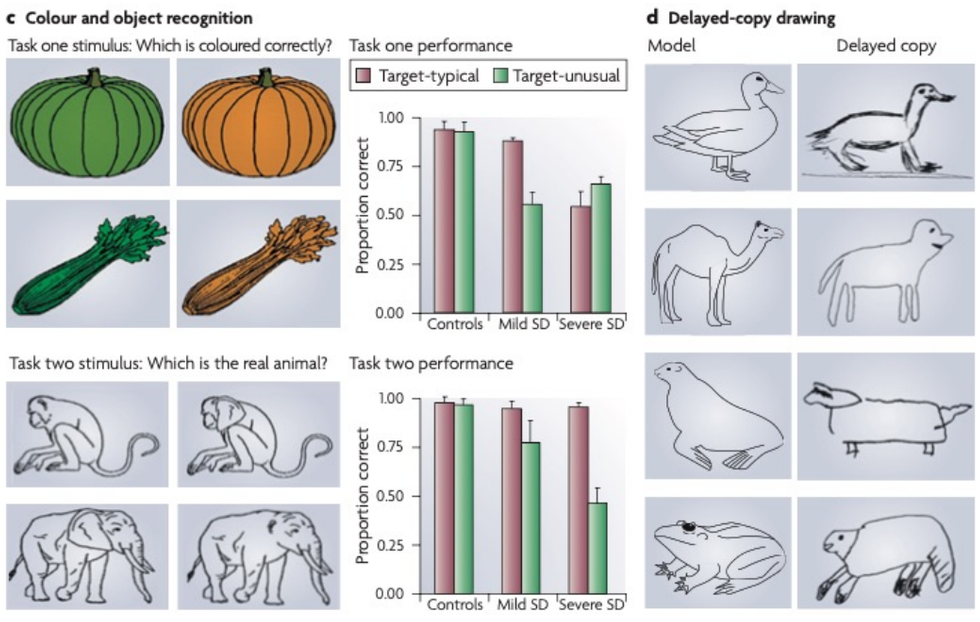


Figure 2 | **Examples of impaired performance on semantic tasks in patients with semantic dementia.** This figure illustrates the cross-modal nature of the impairment and the preservation of general relative to specific information in semantic dementia (SD). **a** | Accuracy at discriminating targets from distractors in a picture-categorization task for four groups of participants: healthy controls and patients with mild, moderate and severe SD[72]. Participants viewed a category label followed by a colour photograph and were asked whether the picture matched the label. Labels were either general (for example, 'animal'), basic-level (for example, 'dog') or specific (for example, 'Labrador'). **b** | Picture-naming responses for one SD patient who was assessed longitudinally[68]. + denotes a correct response. **c** | Examples of stimuli and performance (for controls, mild and severe SD patients) on two recognition tasks. In the first task, participants judged which of two items was coloured correctly. Patients with milder SD performed well when the targets had a category-typical colour (for example, the green celery) but poorly when the items had an unusual colour (for example, the orange pumpkin). The judgements of patients with more severe SD were no better than chance (50%) in either condition[80]. In the second task, participants judged which of two drawings depicted a real animal. Here, both the patients with mild SD and the patients with severe SD achieved normal levels of success for targets with relatively prototypical features (for example, the monkey which, like most animals, has small ears). For stimulus pairs in which the correct choice had unusual features (for example, the elephant, which has very large ears), the patients with mild SD were impaired and the patients with severe SD scored at chance levels[70]. **d** | Delayed-copy drawings produced by SD patients[71]. The patients were shown a model picture which was then removed and, after a 10-second delay, they were asked to reproduce this picture from memory. Properties that are common to most animals, such as eyes and a tail, were preserved in the delayed drawings. Unusual properties that distinguish one animal from others — for example, the hump on the camel and the flippers on the seal — were frequently omitted. Some common properties were also incorrectly added to animals that lack them (for example, the four legs on the delayed drawing of the duck and the tail on the delayed drawing of the frog). Real animal pictures in part **c** reproduced, with permission, from REF. 97 © (1980) American Psychological Association.

Patterson, K., Nestor, P. & Rogers, T. T. (2007). Where do you know what you know? The representation of semantic knowledge in the human brain. ***Nature Reviews Neuroscience, 8***, 976-988.

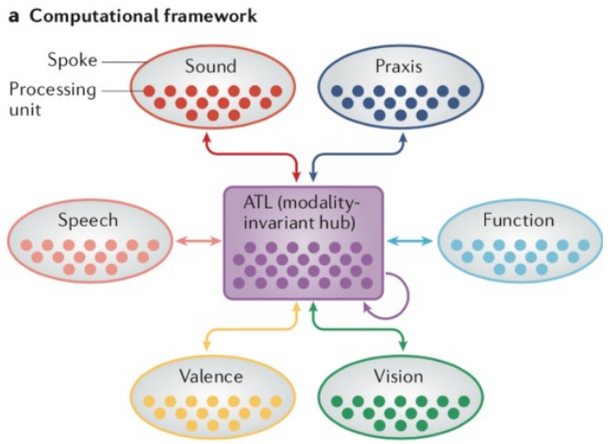
Questions

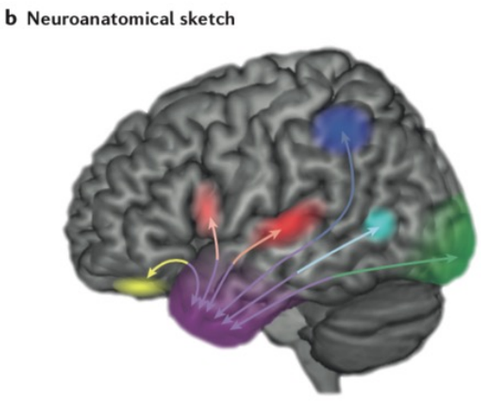
Do lesions in the spokes lead to General semantic deficits or do they just make the retrival of the informations more complicated but in generall the system still works?

The Neural Basis of Semantic Representations: Hub-and-spokes model

a | Modality-specific sources of information (spokes) are coded across a set of processing units within separate processing layers in the model. Each 'spoke' layer is reciprocally connected to a single transmodal 'hub'. The model is trained to take each of the spokes, in turn, as input and, through the hub, to reproduce the correct information across the other spokes. For example, the model is provided with the visual form of each item as input and is trained to reproduce the sounds, names, valence and other types of information that are associated with each item. The emergent result of this training is that the model forms generalizable semantic representations. The progressive, multimodal semantic impairment of patients with semantic dementia can be mimicked by gradually removing the hub connections.

b | A neuroanatomical sketch of the location of the hub and spokes is presented. The hub is located within the anterior temporal lobe (ATL) region, whereas the modality-specific spokes are distributed across different neocortical regions (the same colour coding is used as for the computational model). Each spoke communicates bidirectionally with the ATL hub through short- and long-range white-matter connections (arrows).





Lambon-Ralph, M. A. L., Jefferies, E., Patterson, K., & Rogers, T. T. (2017). The neural and computational bases of semantic cognition. ***Nature Reviews Neuroscience***, ***18***(1), 42–55. http://doi.org/10.1038/nrn.2016.150 **22**

Questions

Do anterograde and retrograde amnesias only affect declarative memory or non-declarative memory as well?

The terms "anterograde" and "retrograde" are used to describe different types of amnesia, specifically in terms of the **temporal direction** of the memory loss and typically for **declarative** memory (as there is typically a dissociation between declarative and non-declaractive).

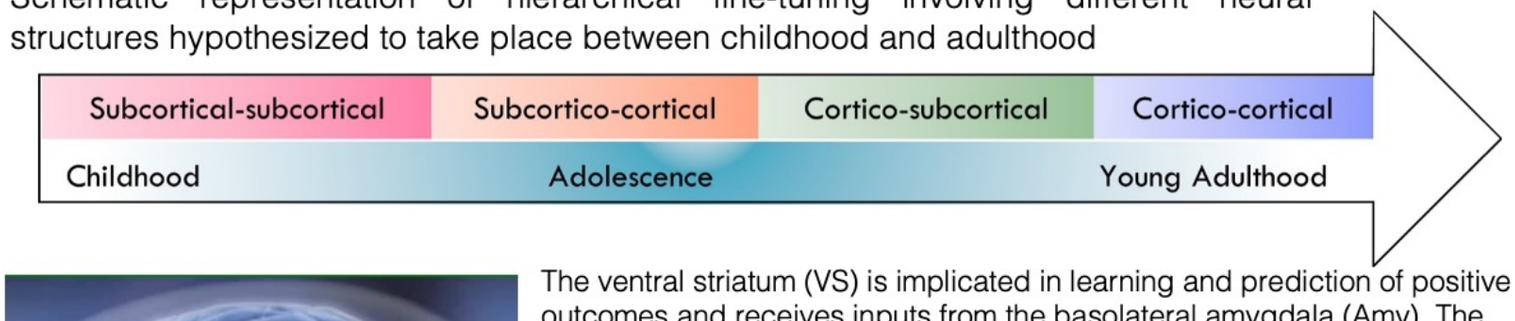
https://link.springer.com/referenceworkentry/10.1007/978-1-4419-1428-6_457

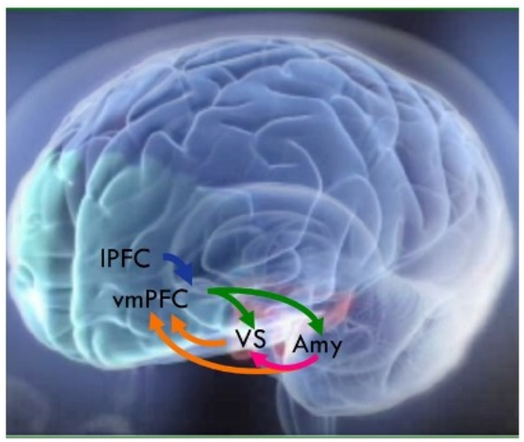
Questions

Someone who wrote the exam last year told me something confusing about the emotional development. Apparently one question out of last years exam, was saying that the development of emotion was “subcorticO-subcortical, Subcortico-cortical (…).” In the Prüfungseinsicht it was marked to be counted as correct. But on this years slide there is written “SubcorticAL- subcortical, Subcortico-cortical (…)”. Now I am a little confused on which one is correct.

Emotional development

Schematic representation of hierarchical fine-tuning involving different neural structures hypothesized to take place between childhood and adulthood





The ventral striatum (VS) is implicated in learning and prediction of positive outcomes and receives inputs from the basolateral amygdala (Amy). The amygdala is important in learning the emotional significance of cues in the environment, and can facilitate ventral striatum activity through its direct inputs from the basolateral nucleus, leading to motivated action. The ventromedial prefrontal cortex (vmPFC) has been implicated in fear and emotion regulation. This region has dense projections to the (inhibitory) cells in the amygdala and to the ventral striatum (VS) that modulate emotive behaviors. Cortico-cortical connections include pathways between lateral prefrontal cortex (lPFC), implicated in higher cognitive functions, and medial prefrontal regions, involved in emotion and social interactions. These connections may serve as an interface between cognitive and emotional processes.

Current developmental models propose that there is a hierarchical fine-tuning that takes place across childhood and adolescence as a function of biological maturation and experience; this process represents a potential mechanism for the observed changes in emotional reactivity and regulation across childhood and adolescence (e.g., patterns of self-control and risk taking).

Casey, B. J., Heller, A. S., Gee, D. G., & Cohen, A. O. (2019). Development of the emotional brain. ***Neuroscience Letters, 693***, 29–34. http://doi.org/10.1016/j.neulet.2017.11.055

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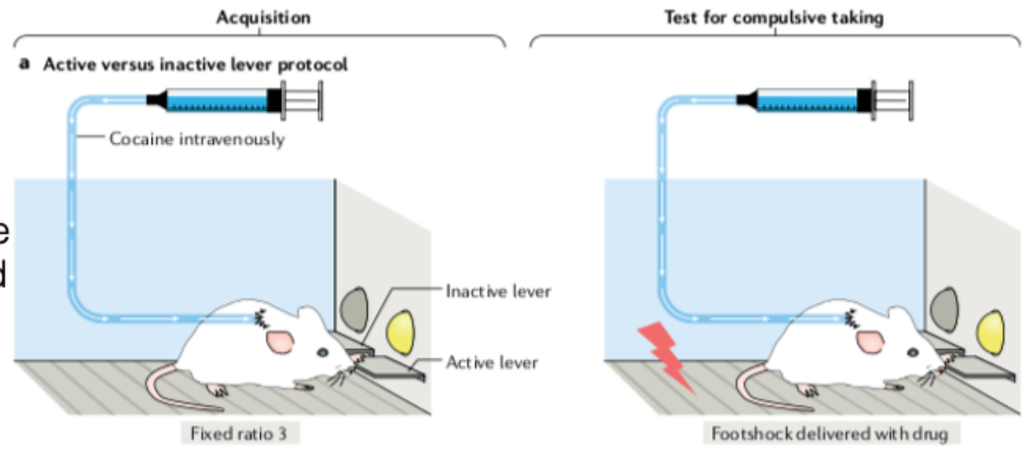
Questions

Would it may be possible to quickly reexplain the drug addiction experiment with mice in the Q&A session?

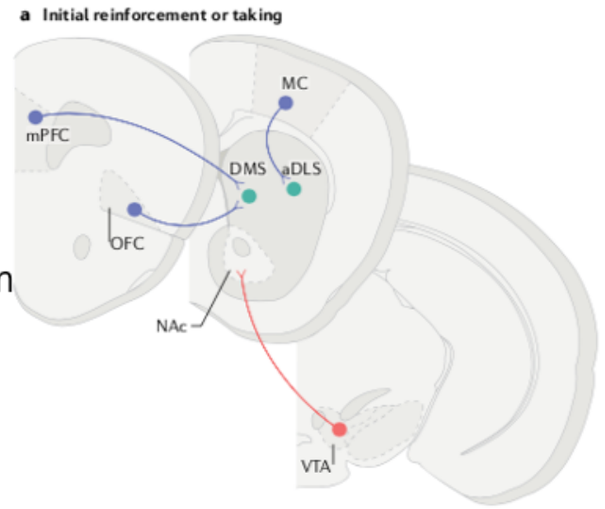
Motivation

Habit formation

In an operant chamber with an active lever and an inactive lever, responding on the active lever results in drug infusion (drug taking), and a presented light stimulus becomes a drug conditioned stimulus through Pavlovian conditioning (left panel). Compulsive drug taking is defined as persistent responding when the lever press is punished at the same time as drug infusion (right panel).



Addictive drugs of different pharmacological classes have a common initial effect of increasing levels of dopamine in the nucleus accumbens (NAc) — particularly dopamine released by neurons projecting from the ventral tegmental area (VTA). This effect is viewed as crucial for initial drug reinforcement. Drug taking depends on plasticity of projections from the medial prefrontal cortex (mPFC) and orbitofrontal cortex (OFC) to the dorsomedial striatum (DMS). Compulsive drug seeking depends on the loss of prefrontal cortical 'top-down' control over the striatal mechanisms underlying drug-seeking habits.



Lüscher, C., Robbins, T. W., & Everitt, B. J. (2020). The transition to compulsion in addiction. ***Nature Reviews Neuroscience***, 1–17. http://doi.org/10.1038/s41583-020-0289-z

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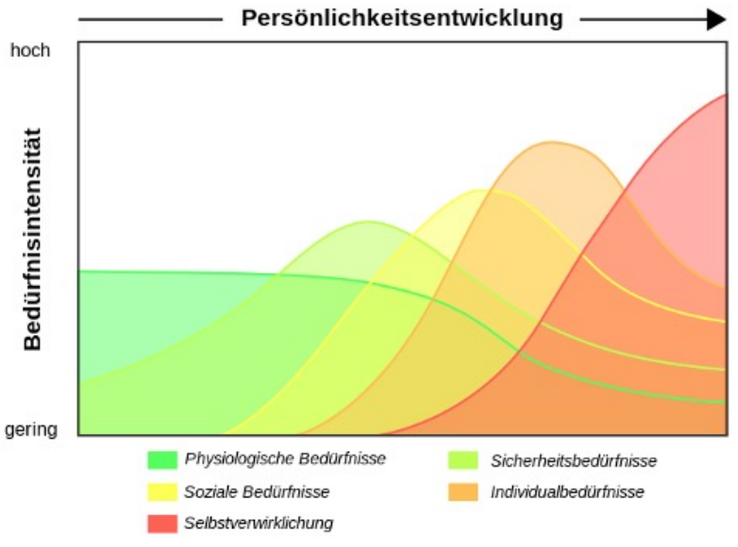
Questions

Is the Experiment of Harlow with the Monkeys contradictory to the hierarchial theories off motivation or not? Because, on the one hand, it shows that the basic needs such as food have to be satisfied, on the other hand, it shows that love and affection for the mother can arise independently of the basic needs and how important this affection is. So I'm not sure if it's a contradiction to the hierarchial Theorie.

One plausible interpretation is that Harlow's experiments demonstrate that once physiological needs are met (the monkeys had access to food), the monkeys sought to satisfy higher-level needs such as love and belongingness, which aligns with Maslow's theory that once basic needs are met, beings seek to fulfill higher-level needs. That said, some interpretations of Maslow's hierarchy propose that the levels aren't strictly sequential. Some needs may be pursued simultaneously and from this perspective, Harlow's experiments could be seen as illustrating this flexibility (monkeys balance several needs) rather than contradicting the theory.

More generally, Harlow's experiments illustrate the attempt of behavioral scientists to quantify different needs and their hierarchy.



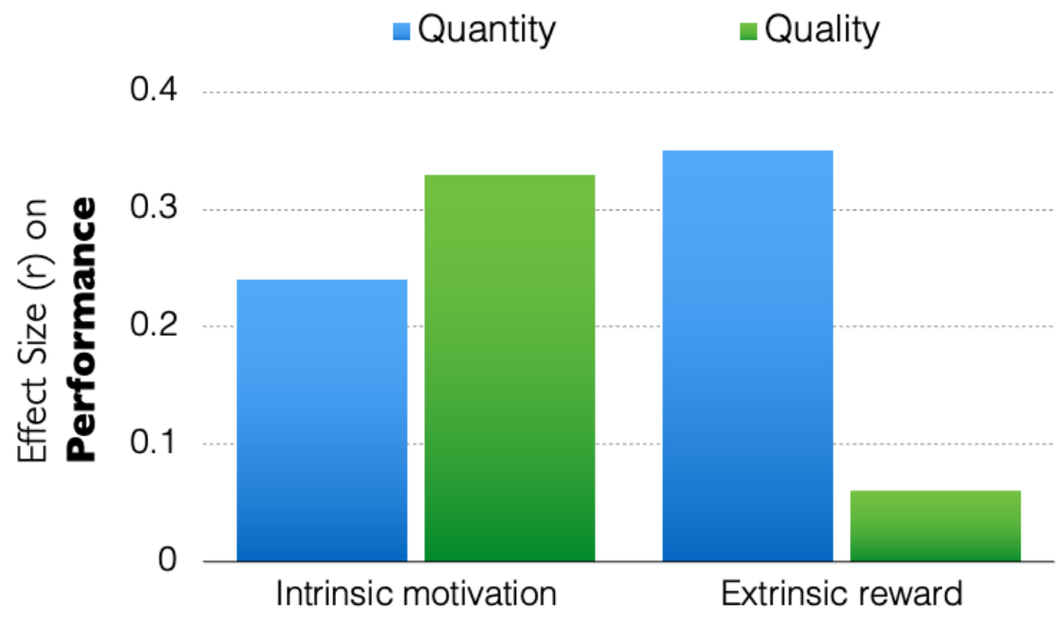
Alternative depiction of the hierarchy of motives, that suggests that that one motive does not need to be completely fulfilled to initiate another.

Questions

Is it true that explicit monetary rewards can hold back or impare people's motivation to go on with activities or not? Someone brought up this statement in our studying group and we are not agreeing about it.

Motivation

Content Theories: Self-determination Theory



Argument for distinguishing between types of motivation: Intrinsic motivation (as measure by self-reported motivation) has overall average positive effects on both quantity and quality of performance, while extrinsic rewards (presence vs. absence of external rewards, such as monetary payoffs) have positive effects on quantity but not quality of performance.

Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. ***Psychological Bulletin, 140***(4), 980–1008.

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