

Flexible Learning Environments

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Flexible Learning Environments

Prof. Dr. Liesbeth Kester

CELSTEC - Open Universiteit

Centre for Learning Sciences and Technologies
celstec.org



Definition

- Starting point for the design of effective and flexible learning environments are the limitations and possibilities of human memory.
- The instructional design of these environments considers:
 - 1) the transiency of sensory memory and working memory,
 - 2) the limitations of working memory and
 - 3) the organization of long term memory.



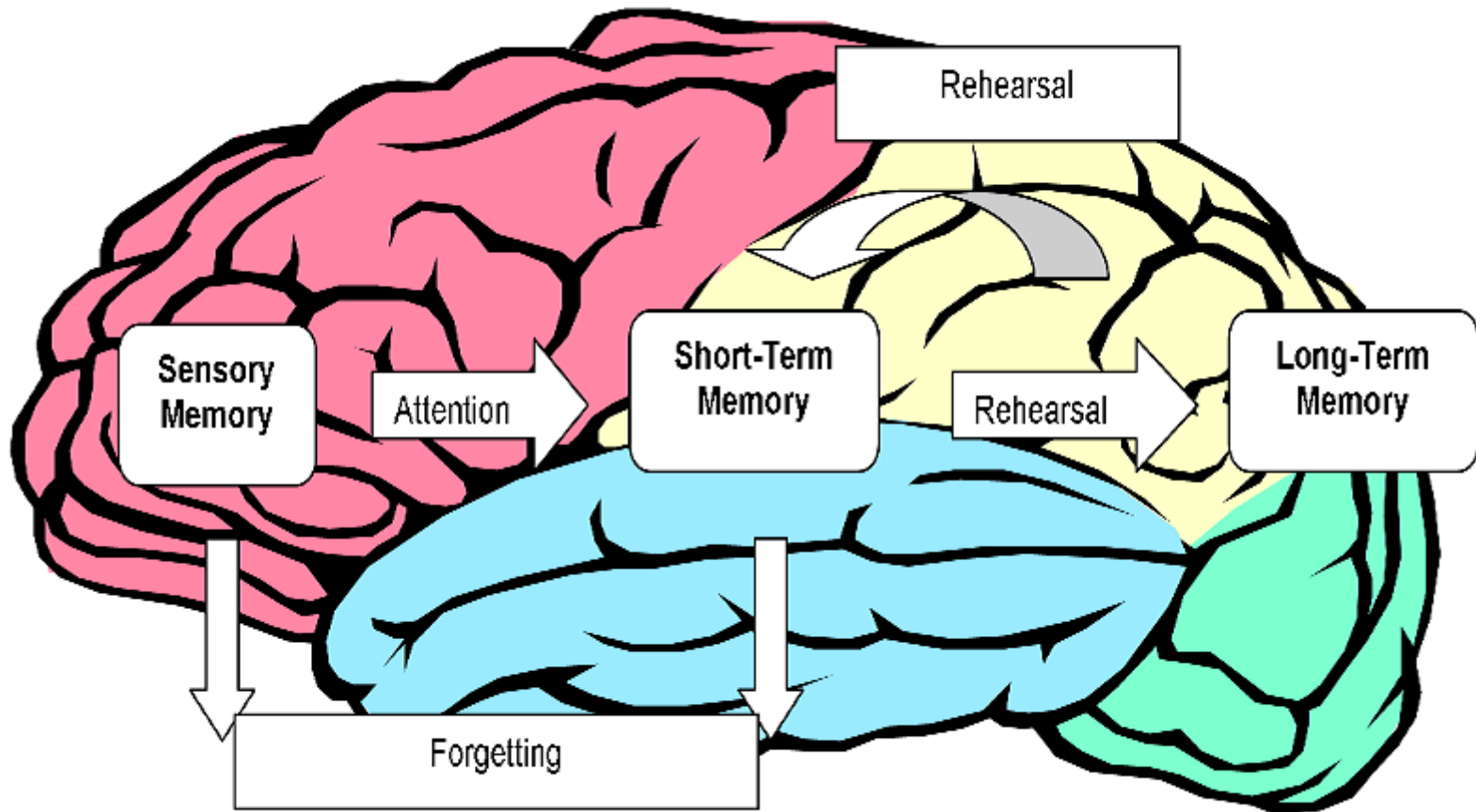
Theory

- Human-memory models
- Cognitive theory
- Instructional design theory



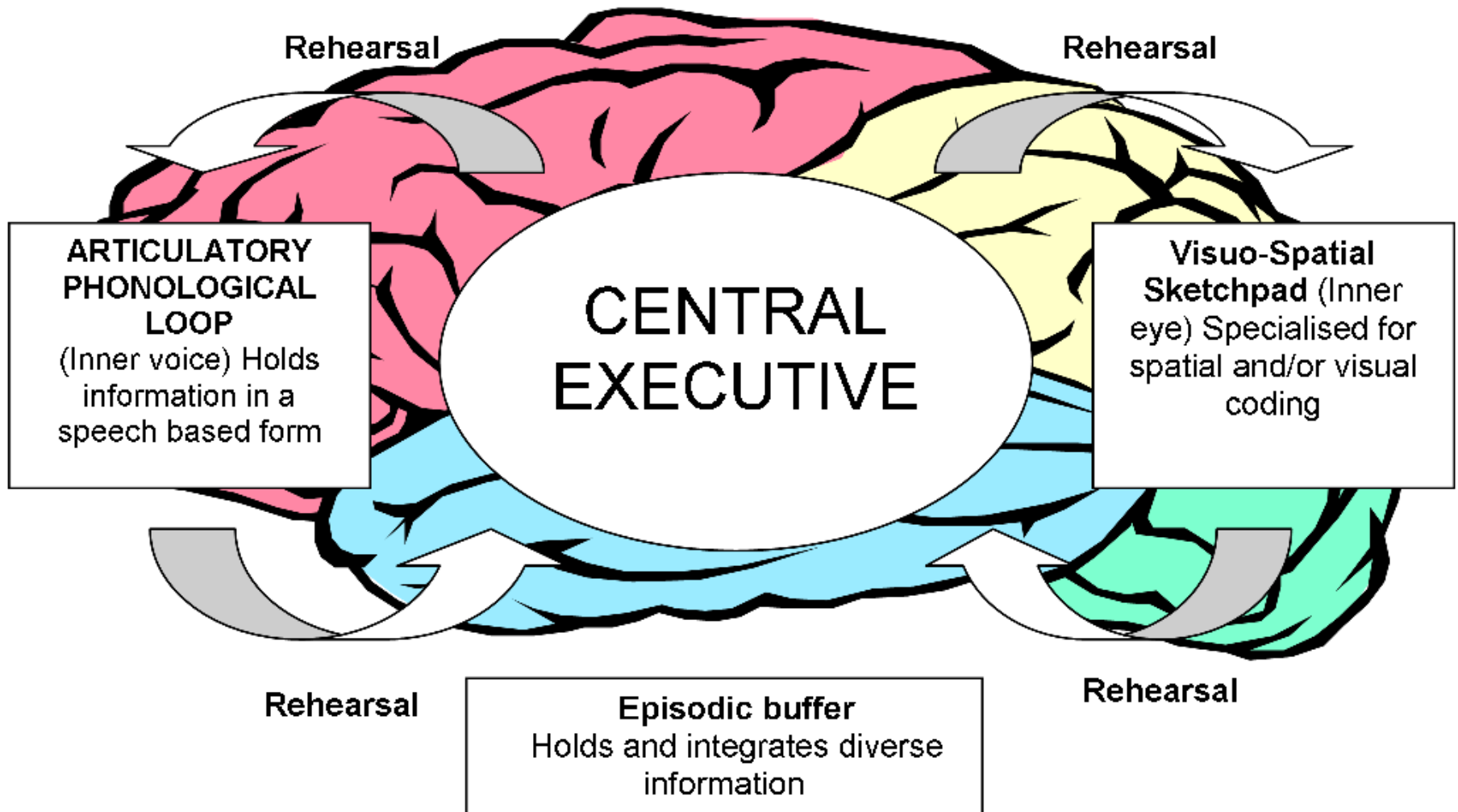
Human memory models

- Atkinson and Shiffrin's 'multi-store' memory model (1968)



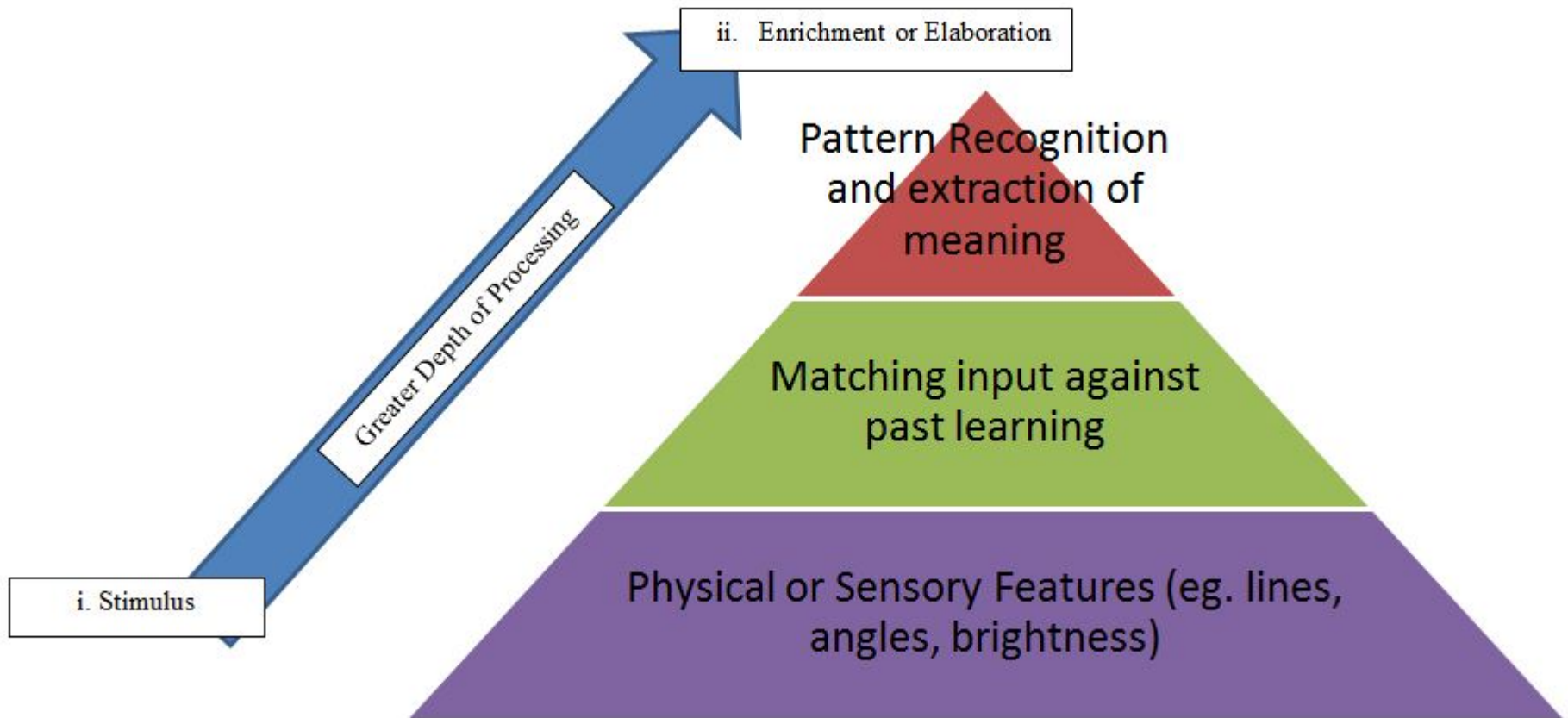
Human memory models

- Baddeley's working memory model (1986, 2000)



Human memory models

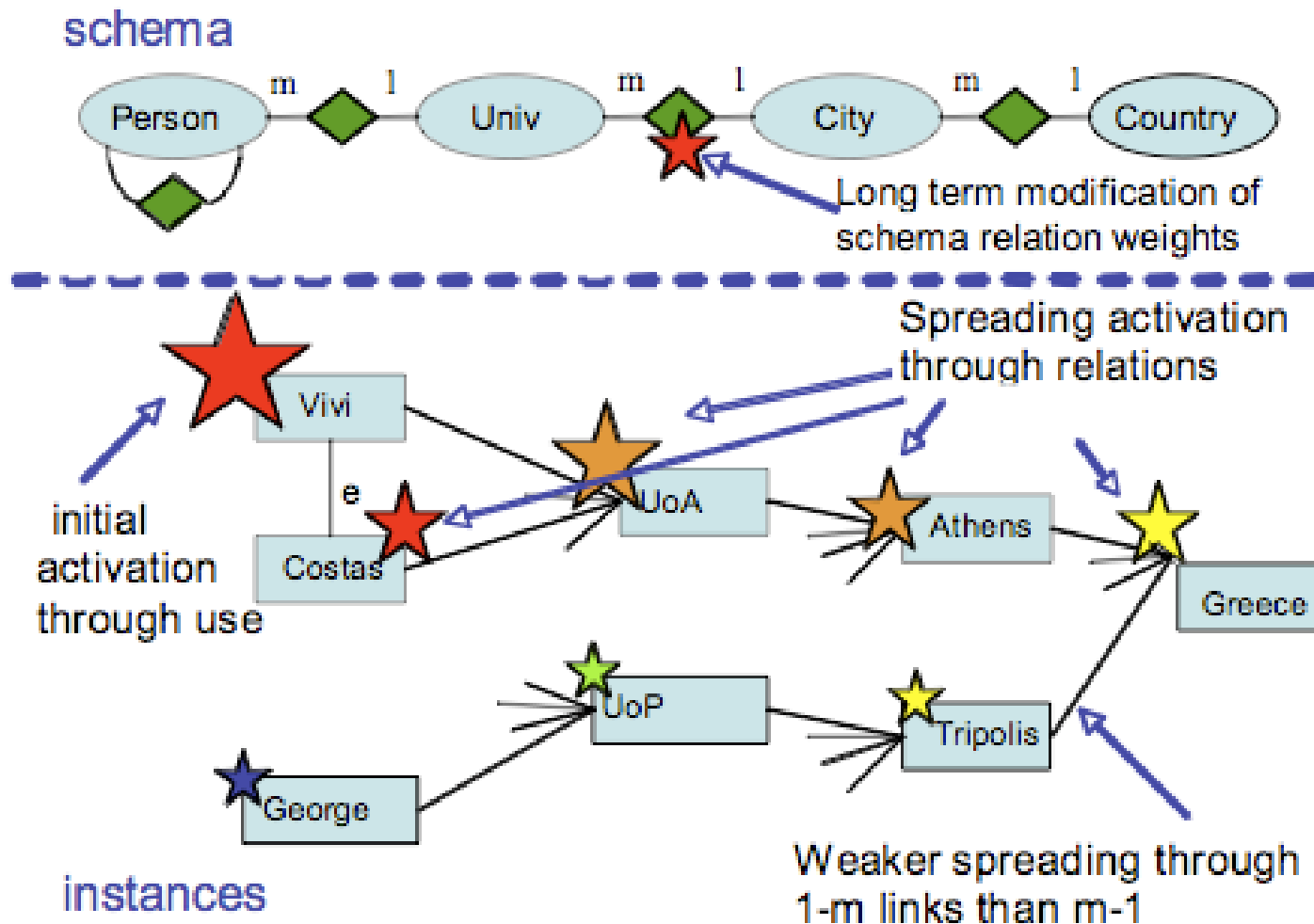
- Craik and Lockheart's 'levels of processing' memory model (1972)



Based on: Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, 11, 671-684.

Human memory models

- Anderson's schema theory (1977)



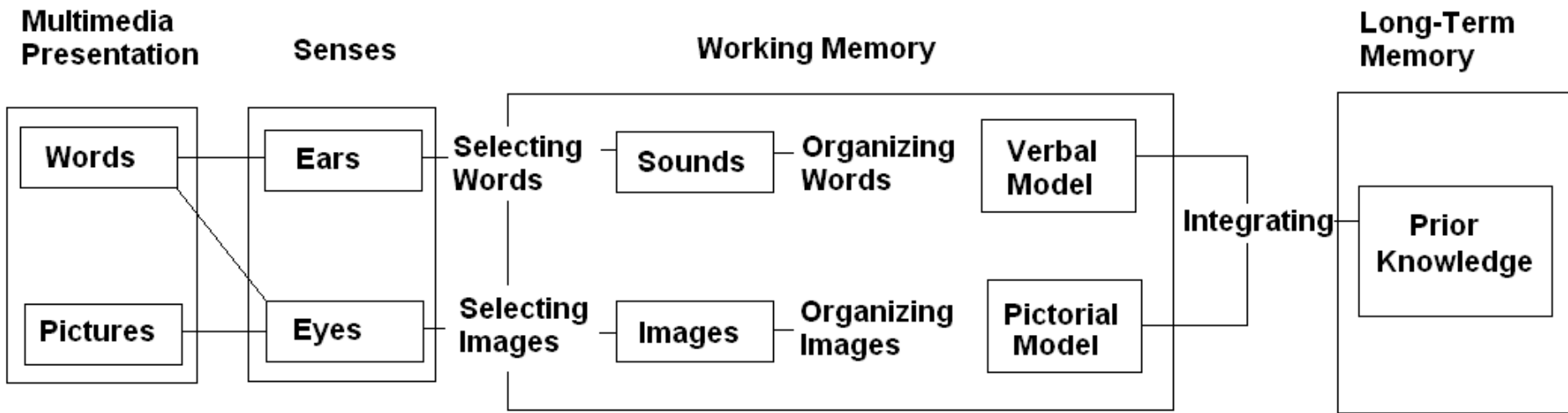
Theory

- Human-memory models
- Cognitive theory
- Instructional design theory



Cognitive theory

- Mayer's cognitive theory of multimedia learning (2001)



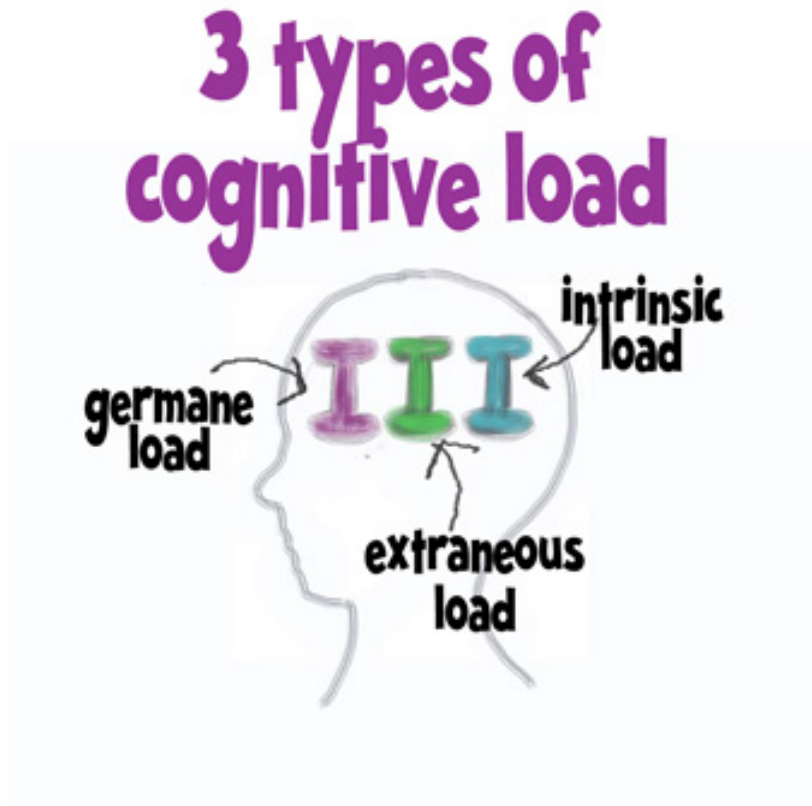
Theory

- Human-memory models
- Cognitive theory
- Instructional design theory



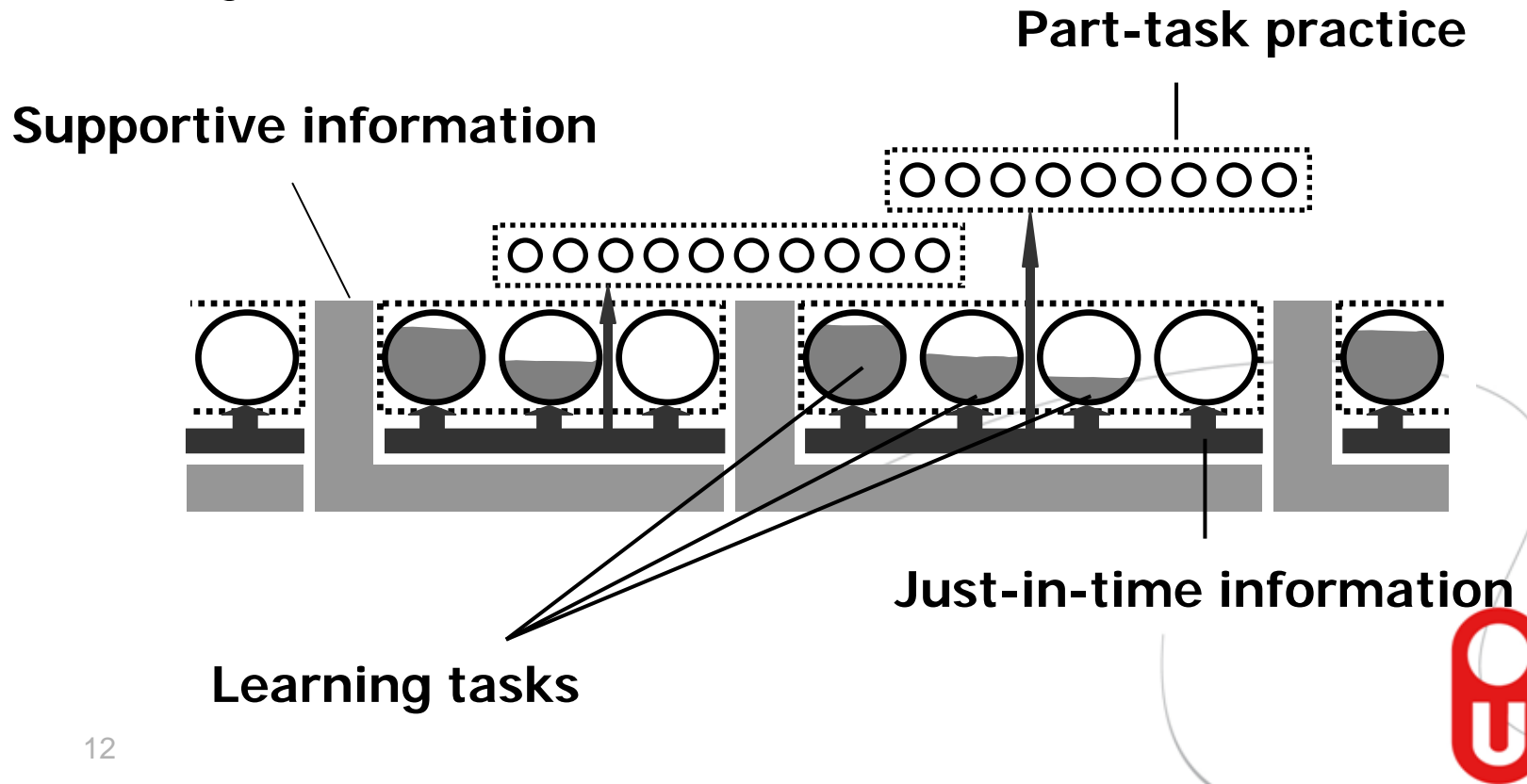
Instructional design theory

- Sweller's cognitive load theory (1999)



Instructional design theory

- Van Merriënboer's four component instructional design model (4CID; 1997)



Flexible learning environments

- Most important feature: dynamic personalisation
- Components: student model, domain model and instructional model
- Issues: no clear guidelines
- Our angle: personalisation through learner control
- Issues: self-directed or self-regulated learning is difficult for novices



Shared control over task selection



- Corbalan (2008), Kester & van Merriënboer
- Theoretical background: cognitive load theory, four component instructional design model
- Research question: Does adaptive learning with shared learner control in a hypermedia environment lead to a higher task performance, a higher learning efficiency and a higher task involvement as compared to non-adaptive learning with or without shared learner control?



Shared control over task selection

- Method
 - Participants: first year students in Dutch Vocational Education and Training
 - Materials: hypermedia environment (75 learning tasks; performance measure; mental effort measure); conceptual knowledge mc test; learning efficiency; task involvement
 - Design: 2x2 factorial design with the factors adaptation (yes, no) and shared control (yes, no)



Shared control over task selection

- Results
 - Main effect for adaptation on the conceptual knowledge test
 - Adaptation > non-adaptation
 - Main effect for adaptation on learning efficiency
 - Adaptation > non-adaptation
 - Main effect for shared control on task involvement
 - Shared control > system control



Shared control over task selection

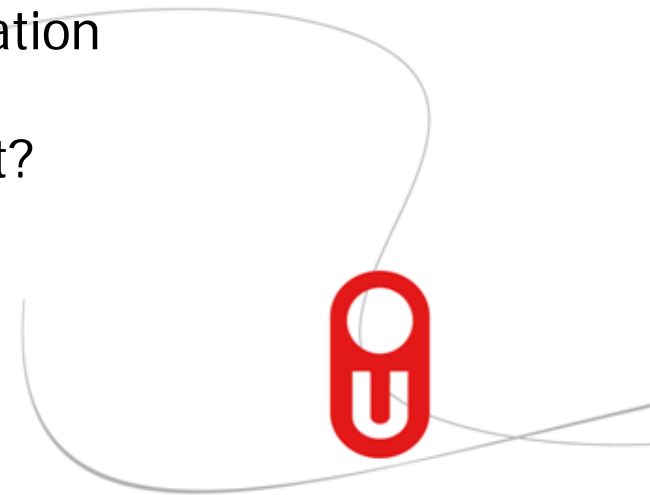
- Conclusions
 - Adaptation positively affects performance
 - Shared control positively influences task involvement (motivation)
- Corbalan, G., Kester, L., & Van Merriënboer, J.J.G. (2008). Selecting learning tasks: Effects of adaptation and shared control on efficiency and task involvement. *Contemporary Educational Psychology, 33*, 733-756.



Following advice in hypermedia environments



- Gorissen (2013), Kester, & Martens
- Theoretical background: cognitive theory of multimedia learning, self-determination theory (Deci & Ryan, 2000; Ryan & Deci, 2000)
- Research question: Does a shared control hypermedia environment increase task motivation and performance as compared to a learner controlled or a system controlled environment?



Following advice in hypermedia environments

- Method

- Participants: 69 grade five students from a primary school
- Materials: hypermedia environment (30 videos); Academic Self-regulation questionnaire; 8 essay questions; factual knowledge test; in-depth knowledge test; Intrinsic Motivation Inventory
- Design: academic self-regulation style (continuous independent variable); shared control, learner control or system control



Following advice in hypermedia environments

- Results
 - main effect of hypermedia environment on the delayed in-depth knowledge test
 - Shared control or system control > learner control
 - main effect of hypermedia environment on controlled task motivation
 - Shared control < learner controlled or system controlled
 - main effect of ASRS on controlled and autonomous task motivation
 - 'Autonomous learners' < 'controlled learners' for controlled task motivation
 - 'Autonomous learners' > 'controlled learners' for autonomous task motivation



Following advice in hypermedia environments

- Conclusions
 - Following advice positively affects performance
 - Shared control decreases controlled task motivation (extrinsic motivation)
 - Academic self-regulation style influences task motivation



Advisory models in on-demand education [1]



- Taminiau (2012), Kester, Kirschner & van Merriënboer
- Theoretical background: cognitive load theory, four component instructional design model
- Research question: Does procedural advice on task selection help learners develop domain-specific skills?



Advisory models in on-demand education [1]

- Method
 - Participants: 30 students Business and Economics
 - Materials: e-learning environment (81 tasks); task-selection advice; test tasks; knowledge test
 - Design: randomized two group design > task-selection advice (yes, no)



Advisory models in on-demand education [1]

- Results
 - Significant differences between groups on the test tasks
 - no task-selection advice > task selection advice
 - No significant differences between groups on the knowledge test



Advisory models in on-demand education [1]

- Conclusions
 - Straightforward procedural advice hampers performance

Taminiau, E. M. C., Kester, L., Corbalan, G., Alessi, S. M., Moxnes, E., Gijssels, W. H., Kirschner, P. A., van Merriënboer, J. J. G. (in press). Why advice on task selection may hamper learning in on-demand education. *Computers in Human Behavior*. doi: 10.1016/j.chb.2012.07.028



Advisory models in on-demand education [2]



- Taminiau (2012), Kester, Kirschner & van Merriënboer
- Research question: Does procedural advice on self-assessment and task-selection help learners develop self-assessment and task-selection skills?



Advisory models in on-demand education [2]

- Method

- Participants: 63 students Business and Economics
- Materials: e-learning environment (81 tasks); self-assessment advice; task-selection advice; self-assessment test tasks; task-selection test tasks
- Design: randomized four group design with the groups self-assessment and task-selection advice, only self-assessment advice, only task-selection advice or no advice



Advisory models in on-demand education

- Results
 - Significant differences between groups on the self-assessment test tasks
 - no self-assessment advice > other groups
 - No significant differences between groups on the task-selection test tasks



Advisory models in on-demand education

- Conclusions
 - Straightforward procedural advice hampers self-assessment performance



Overall conclusions

- Dynamic personalisation in flexible learning environments still seems wise
- Transferring the responsibility over learning to learners does not necessarily enhance their performance despite of the fact that it increases their motivation
- Advice that helps learners find their way in flexible learning environments works as long as it is not too prescriptive



Thank you for your attention!

- Contact:

- Gemma Corbalan (g.corbalan@slo.nl)
- Chantal Gorissen (chantal.gorissen@ou.nl)
- Bettine Taminiau (bettine.taminiau@ou.nl)

- Liesbeth Kester (liesbeth.kester@ou.nl)

Centre for Learning Sciences and Technologies
celstec.org

