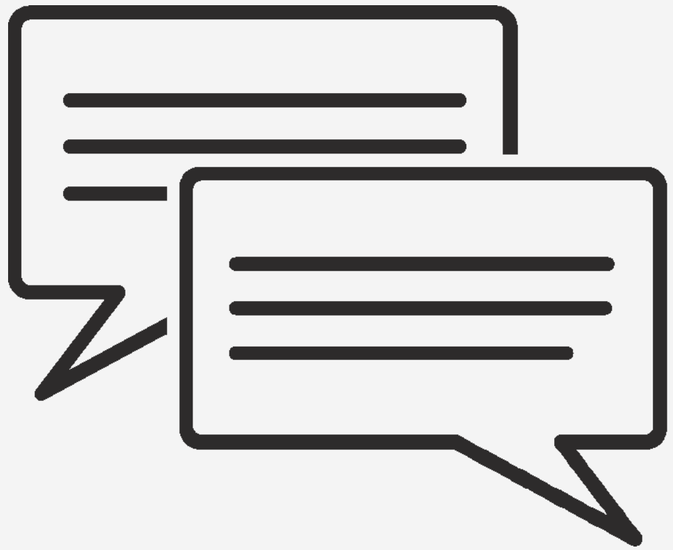
The Animation Composition Principle

Dr Luke A. Rudge
07/12/2022

How can animations be used in Instructional Design (ID)?



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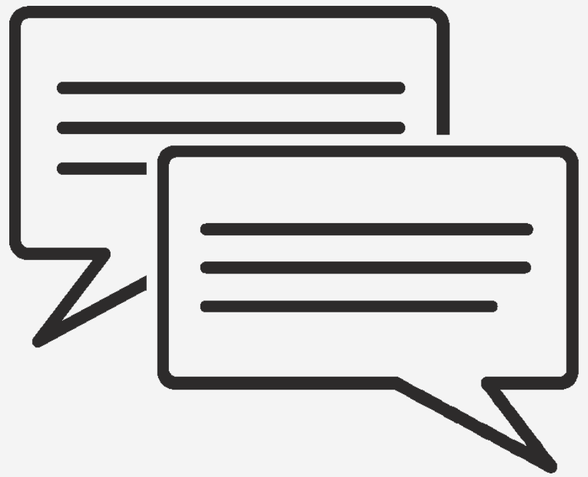
What makes a 'good' animation (in ID terms)?



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Animation Composition Principle

- Based on Lowe, Schnotz and Boucheix (2022)
- Core tenet: learning over time through "compositional processing" (p.313) to successfully build a mental model

One of many principles in multimedia learning (e.g., Split-Attention, Redundancy, Modality, Transient Information, Embodiment, etc.)

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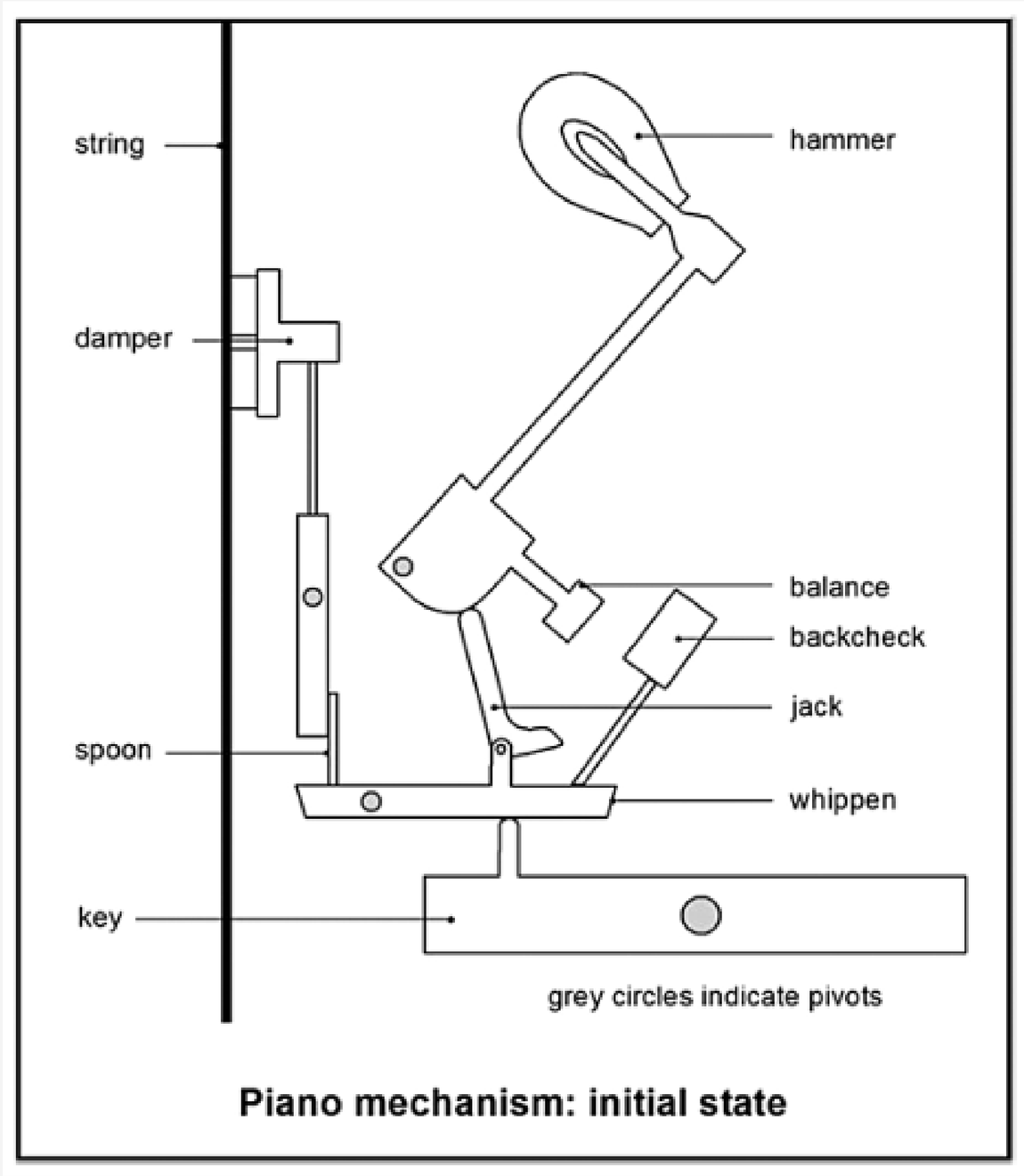
"A learner's understanding of an animation develops as the result of incremental processing by which discrete information primitives are progressively and hierarchically combined." (p.313)

Learners benefit from animations that:

- focus on relevant, 'chunked' information, and
- gradually show development, distinction, or cause-effect chains.

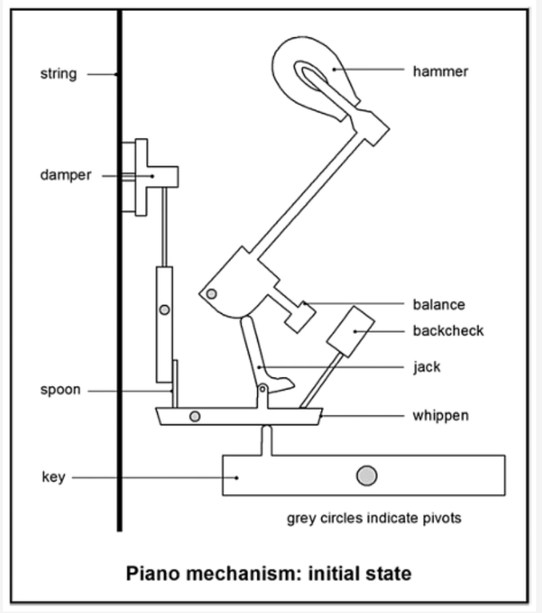


Lowe and Boucheix, 2016, p.74

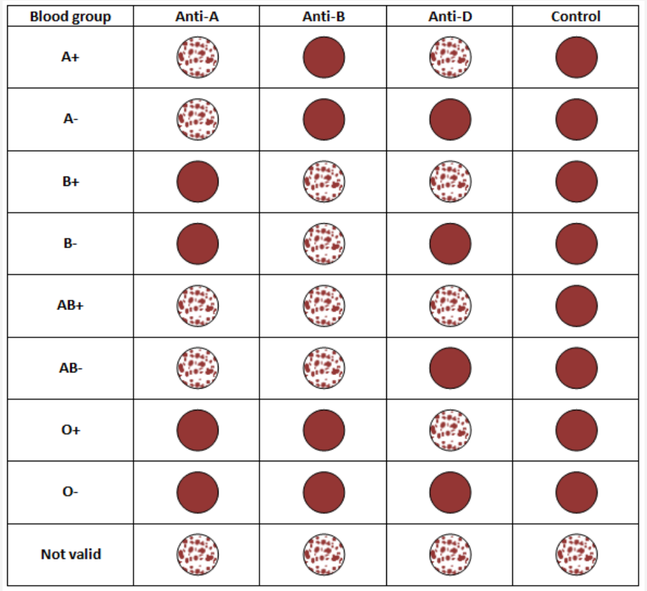
Animated or static?

- Meta-analyses show animations are highly effective when demonstrating 'complex' change over time (p.316)
- Animation can be used to capture attention when used appropriately around other media

- Adding or using animation with something that neither requires focus nor demonstrates change may lead to more confusion than understanding
- 'Animation overload' will negatively impact comprehension



Piano mechanism: initial state



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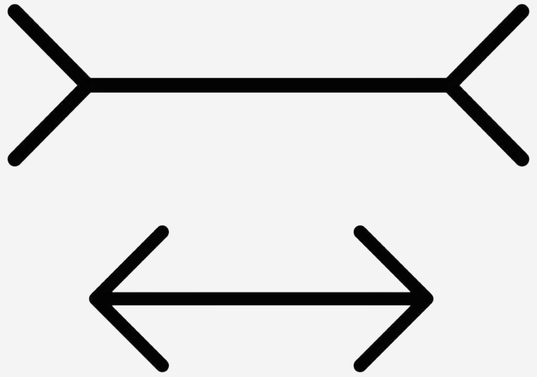
Perception



The Müller-Lyer illusion

Figure-ground

- When we observe something, our brains first perceive things using pre-attentive processes
- These processes occur independently of our prior knowledge and are almost impossible to modify
- Related to:
  - Gestalt laws (proximity, similarity, continuity...);
  - the figure-ground principle: using our perception to understand what we see through size, contrast, movement, and so on

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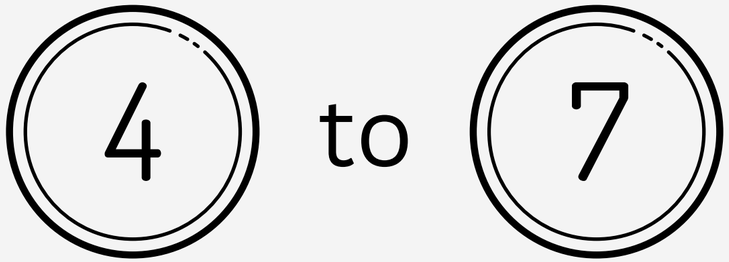
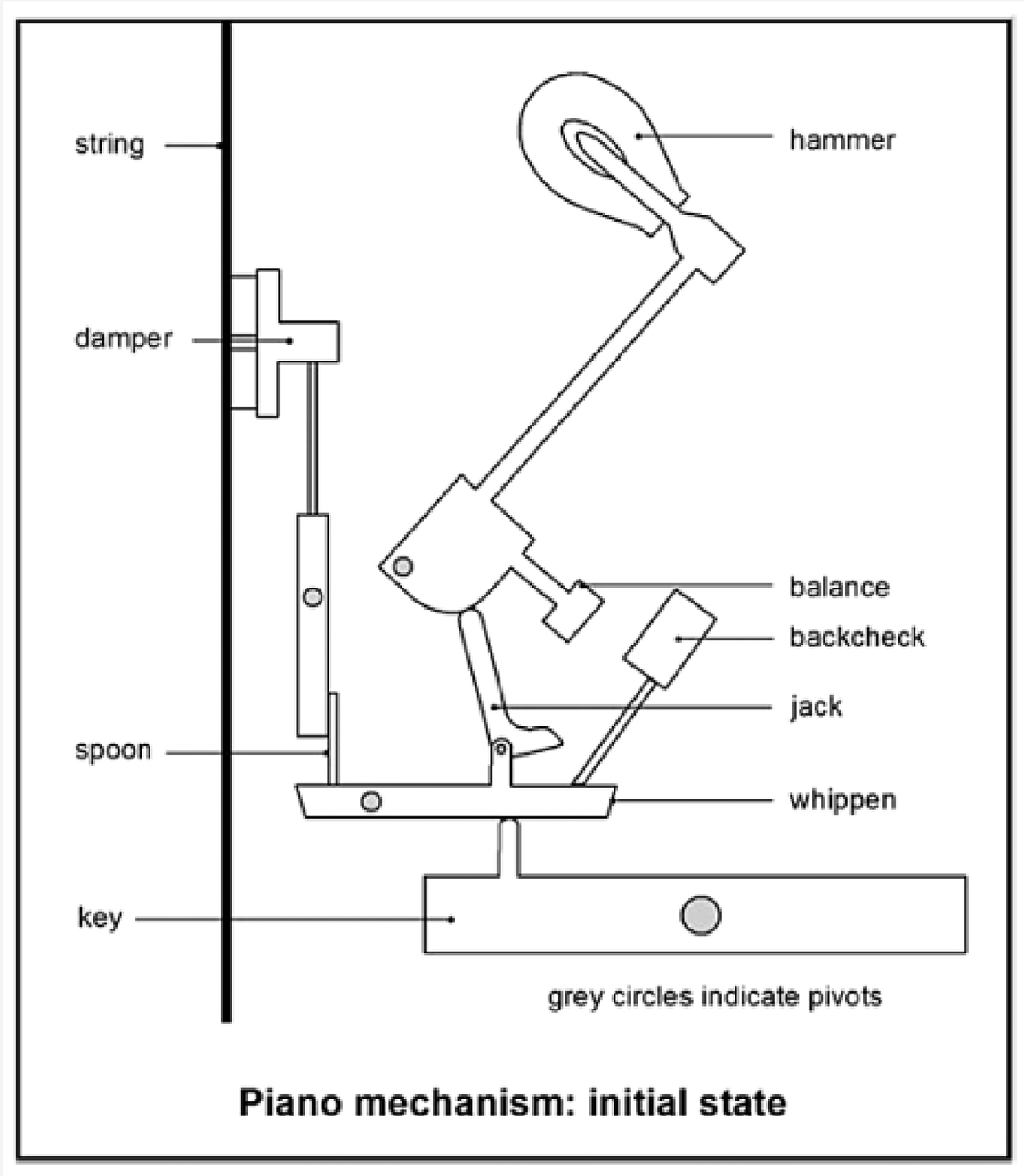
Cognition



The number of elements that can be dealt with in working memory

- Perception leads to cognition: making sense of what we perceive
- This involves "not only recognition of what is shown [but also] the higher order relationships that exist between the presented entities and their respective behaviors" (p.319)

- Although advanced, our brains still have limited cognitive capacity when it comes to working memory



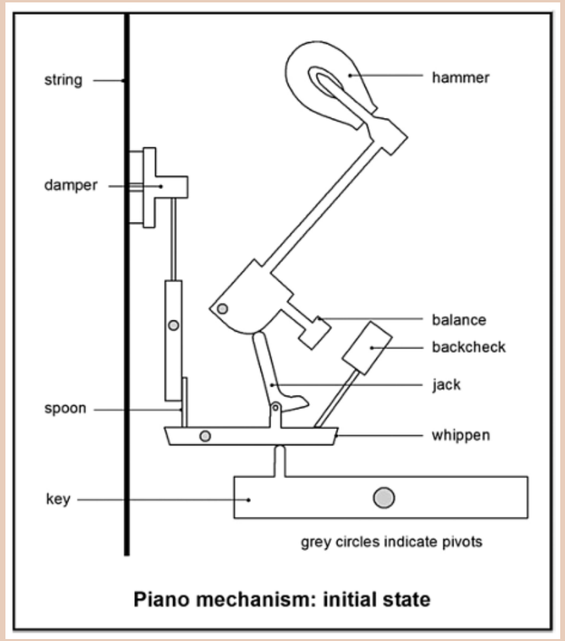
Lowe and Boucheix, 2016, p.74

Implications for ID

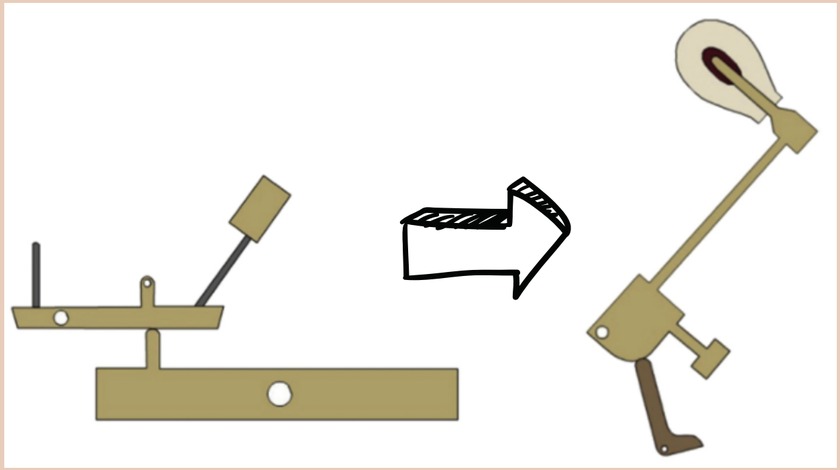
- Think beyond the space available (visuospatial) and consider the *timing* of information (spatiotemporal)
- De-compose the message, then re-compose it over time
- Use cueing to assist with visual complexity

Cueing
Using some form of visual contrast to direct attention to a specific part in a complex whole.

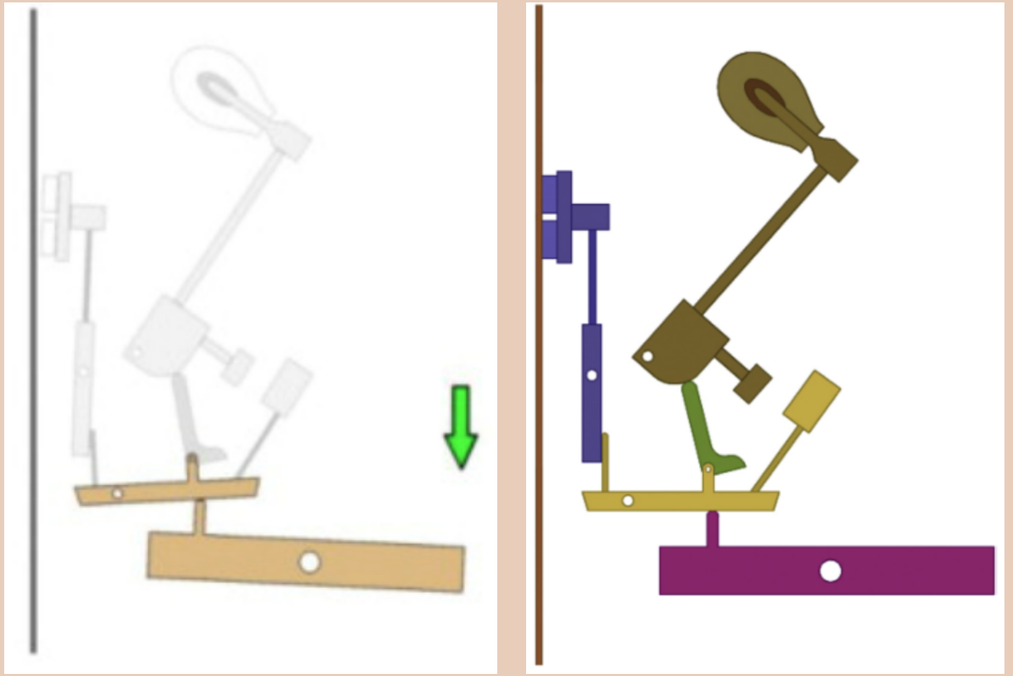
Comprehensive, Compositional and Hybrid



Lowe and Boucheix, 2016, p.74



Boucheix et al., 2013



Lowe and Boucheix, 2016, p.76

1

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Other tips for improving animation effectiveness

- Give learners the chance to control the speed of the animation (especially for procedural information)
- Alongside cueing, split the animation into shorter 'scenes'

Task 1

Critiquing the "Doubling Dilution" animation based on today's content

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Task 2

Using Vyond to create an animation (either a procedure or using cueing to highlight information)

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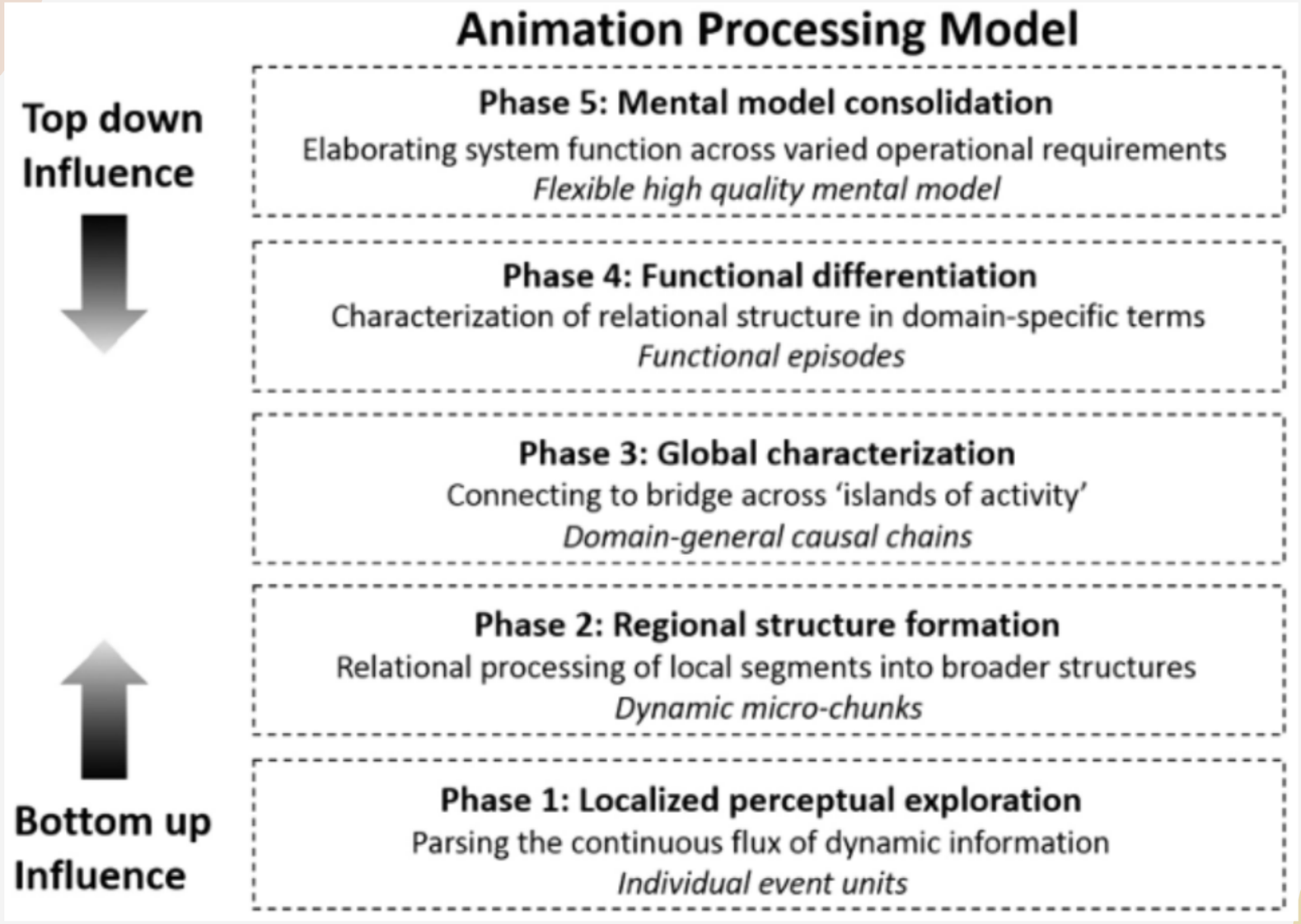

Lowe and Boucheix, 2016, p.74

References

- Boucheix, J-M., Lowe, R. K., Putri, D. K. and Groff, J. (2013). Cueing animations: Dynamic signaling aids information extraction and comprehension. *Learning and Instruction 25*: 71-84.
- Lowe, R. K. and Boucheix, J-M (2016). Principled animation design improves comprehension of complex dynamics. *Learning and Instruction 45*: 72-85.
- Lowe, R. K., Schnotz, W. and Boucheix, J-M. (2022). The Animation Composition Principle in Multimedia Learning. In R. E. Mayer and L. Fiorella (eds.), *The Cambridge Handbook of Multimedia Learning* (pp.313-323). Cambridge: Cambridge University Press.