Designing optimal peer support to alleviate learner cognitive load in Learning Networks

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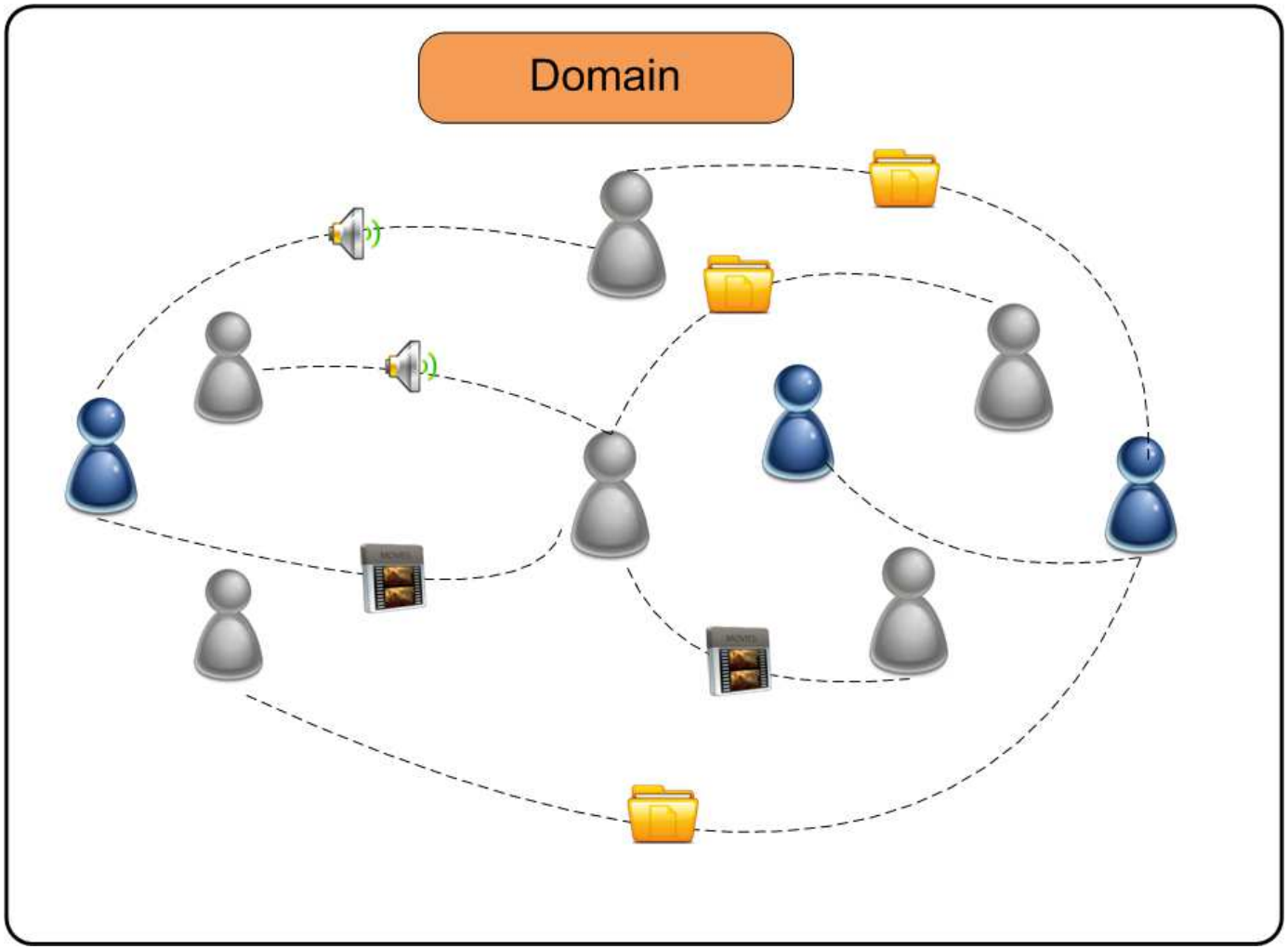
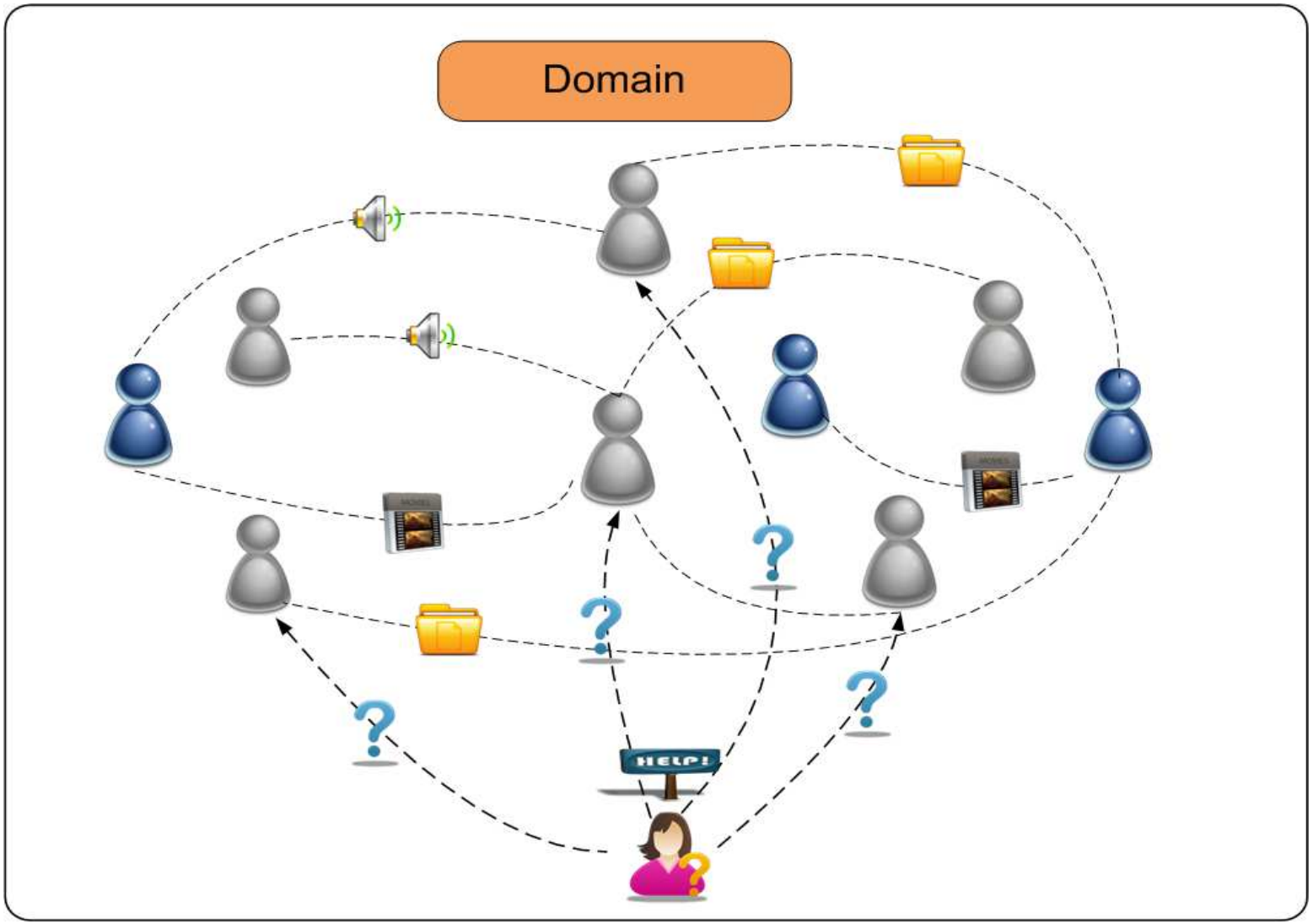
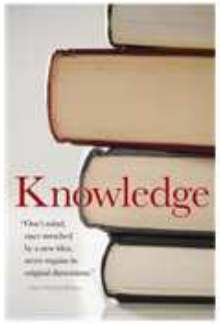
Learning Networks (LNs) and knowledge sharing



Stage 1: Finding relevant knowledge sharers



Stage 2: Maintaining social interaction to reach shared understanding

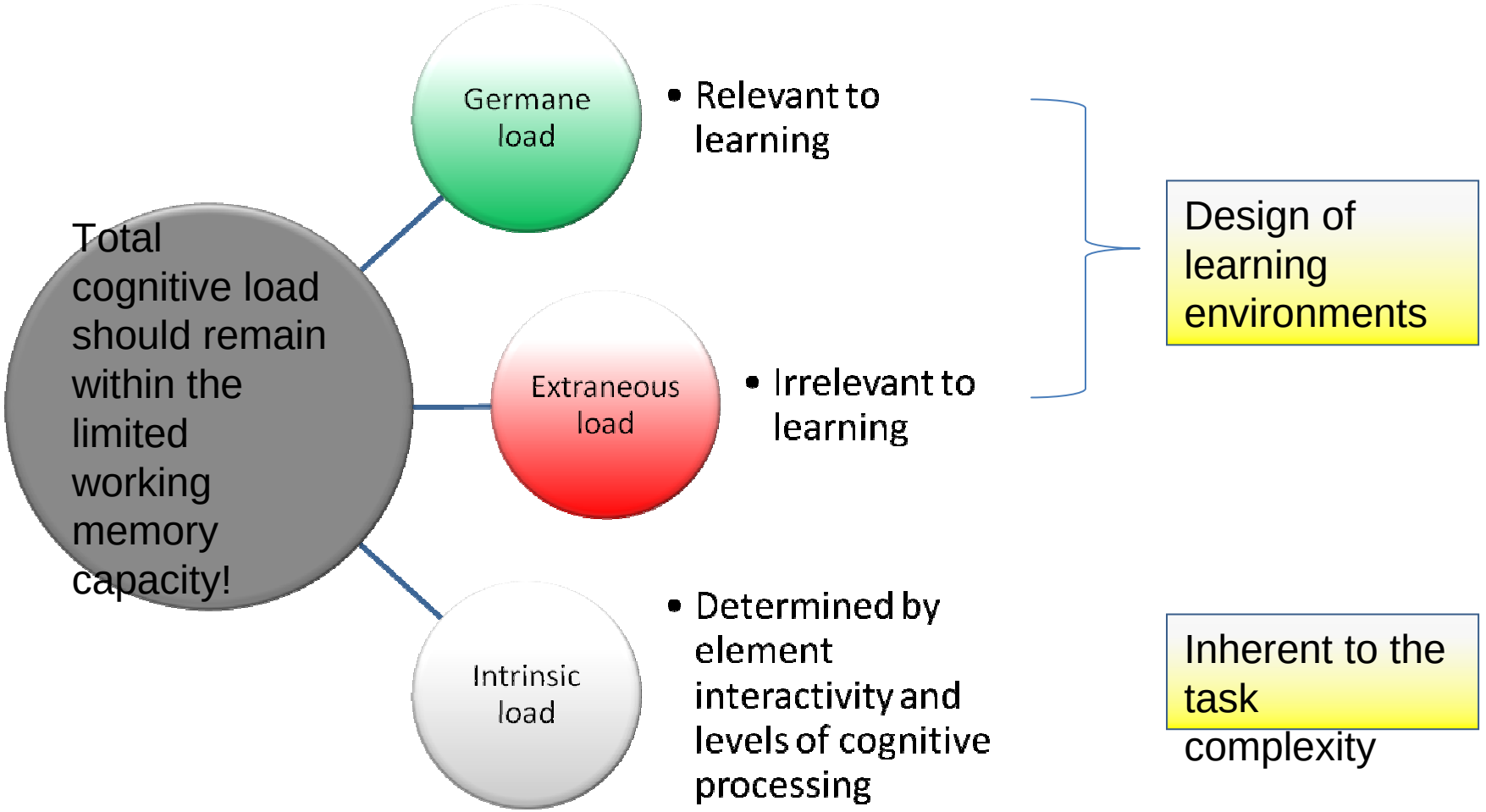


Knowledge sharing

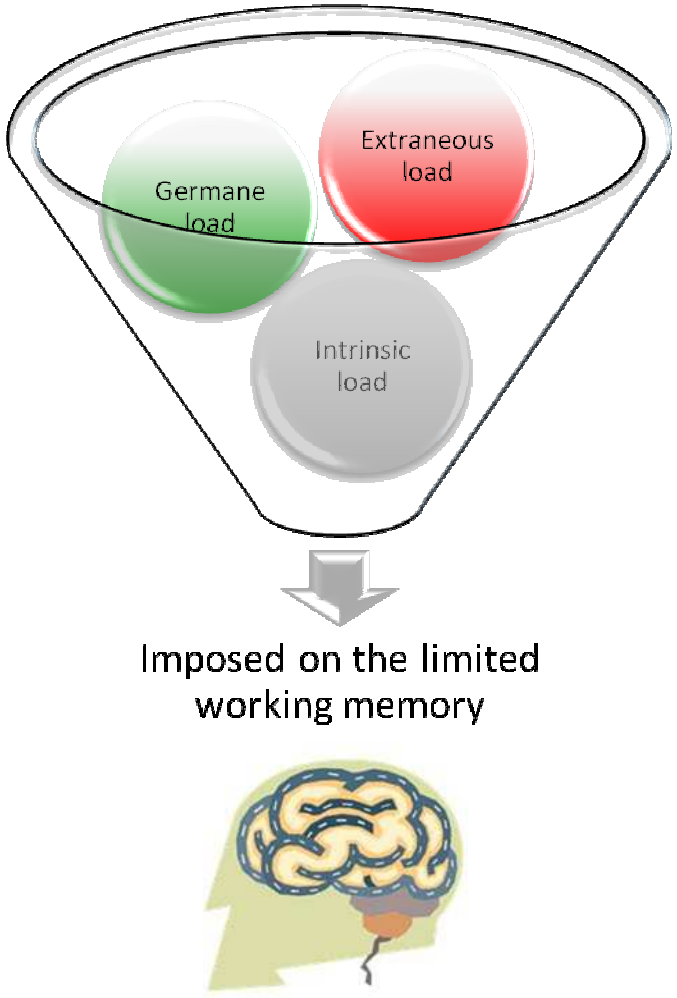
Tutor

Tutee

Cognitive load theory and three types of cognitive load



Cognitive load theory and design guidelines



- When working on complex tasks, it is imperative to reduce extraneous load.
- An optimal design of learning environments should both reduce extraneous load and induce germane load at the same time.

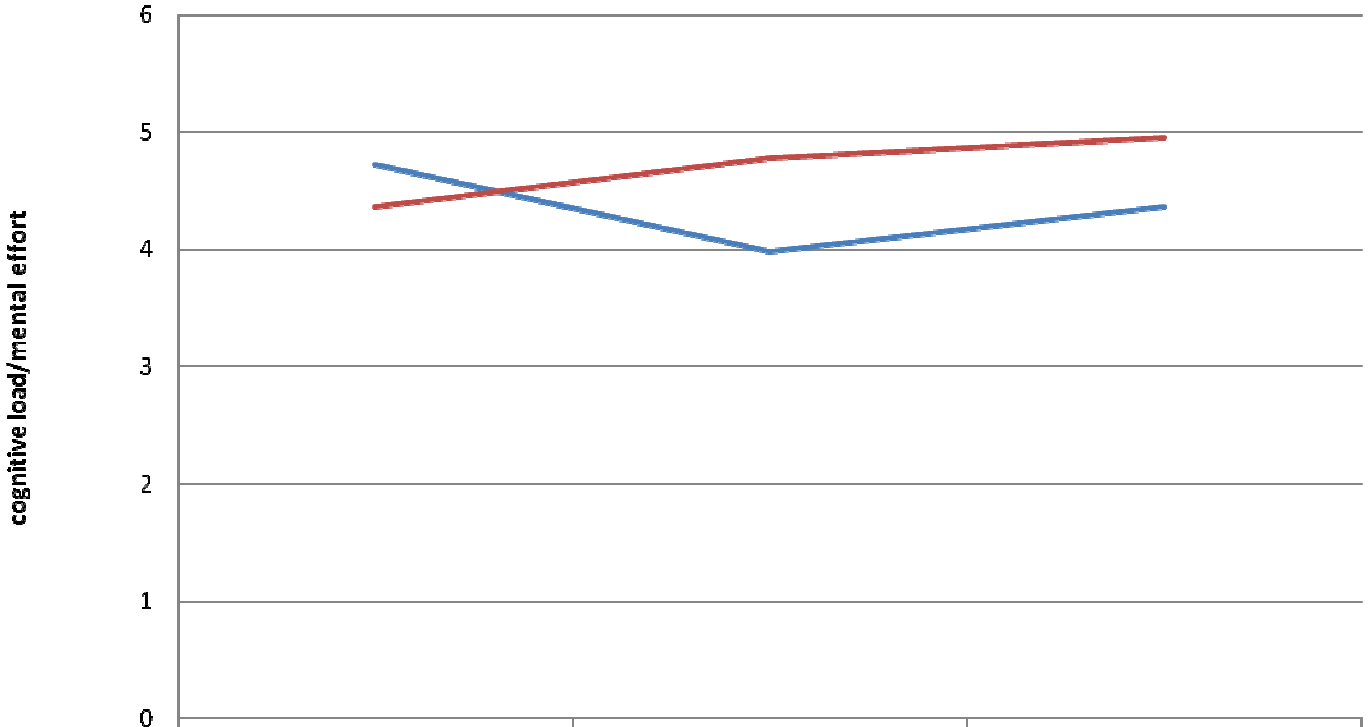
Exploring how to design an optimal peer support system

- Study 1
  - ➢ What are effects of applying a technology-enhanced peer support system (PSS) on learner cognitive load?
- Study 2
  - During knowledge sharing, what are effects of supporting tutors with content knowledge and tutoring skills on learner cognitive load?

Study 1: A between-groups design with two independent variables

	Types of support	Task complexity	
		Simple task	Complex task
No support at all (individual learning)	Control	n = 90	n = 90
Supporting stage 2: The communication process (conventional scenarios)	Forum	n = 90	n = 90
Full support for stage 1 and 2: Automated tutor selection system, instructions of role tasks, and a wiki	PSS	n = 90	n = 90

Results of learner cognitive load on unidimensional mental effort rating scale (Paas, 1992)



	Control	Forum	PSS
Simple	4,726	3,977	4,358
Complex	4,361	4,782	4,957

Findings and discussion of Study 1

- Very few questions were asked:
  task complexity and needs of knowledge sharing
  no sense of community
- An experimental design in a naturalistic LN:
  no control of time and task submission

Study 2: A quasi-experimental design with two classes of Chinese Beginners Course

- Students worked in pairs to complete two tasks:
- - Making a conversation to order meals at a Chinese restaurant (15 min)
- - Performing this conversation (without referring to any notes) (15 min)
- For each pair, one student acted as tutor and the other as tutee.

Class 1: TS	Class 2: CK
Tutors received instructions of tutoring skills, which consisted of procedures of processing tasks.	Tutors received content knowledge, which consisted of a list of learned vocabulary and sentence patterns.

Results of learner cognitive load on six rating sub-scales of NASA-Task Load Index

		TASK 1: MAKE A CONVERSATION					
		mental demand	physical demand	temporal demand	performance	effort	frustration
Tutoring skills	Median	14.00	5.00	16.00	10.00	12.50	3.50
Content knowledge	Median	14.00	10.00	14.00	7.00	12.00	9.00
		TASK 2: PERFORM THE CONVERSATION					
		mental demand	physical demand	temporal demand	performance	effort	frustration
Tutoring skills	Median	14.00	5.50	9.50	6.50	13.00	3.50
Content knowledge	Median	10.00	8.00	10.00	7.00	10.00	7.00

Findings and discussion of Study 2

- Learners supported with TS or CK experienced cognitive load differently.
- In particular, the CK group experienced significantly more frustration than the TS group.
- Needs of objective performance measures
- Refining the instructions of tutoring skills: Cognitive task analysis