



 **Earli** SIG2  
Geneva 2016

*Learning from Text and Graphics  
in a World of Diversity*

## CONFERENCE GUIDE

July 11<sup>th</sup> – 13<sup>th</sup> 2016  
University of Geneva, Switzerland



**UNIVERSITÉ  
DE GENÈVE**

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- Franck Amadiou, University of Toulouse
- Sandra Berney, University of Geneva (co-chair)
- Mireille Bétrancourt, University of Geneva (co-chair)
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- Neil Schwartz, California State University at Chico
- Tina Seufert, University of Ulm
- Helge I. Strømsø, University of Oslo
- Huib Tabbers, Erasmus University Rotterdam (co-chair)
- Marije van Amelsvoort, Tilburg University
- Jan van der Meij, University of Twente
- Peggy van Meter, Penn State University
- Eduardo Vidal-Abarca, University of Valencia

## Organizing Committee

- Mireille Bétrancourt (Chair, SIG 2 coordinator)
- Sandra Berney (co-chair)
- Juliette Désiron (SIG 2 JURE coordinator)
- Huib Tabbers (SIG 2 coordinator)

## Acknowledgements

The organization of a conference is always a stressful adventure because of all the very small things and all the very important issues that have to be planned and managed!

First we would like to thank the Faculty of Psychology and Educational Science of the University of Geneva and the EARLI office for their kind support, in making this conference possible. We also take the opportunity to thank our sponsors, the Swiss National Science Foundation and the Fonds Général de l'Université.

Second, we are grateful to all the participants who have come from near and far to present their work and provide us all with such rich opportunities for discussion. This year, we received a total of 74 submissions by 128 different authors from 19 different countries.

We would like to address a particular warm thank to the members of the scientific committee for their participation and expertise in the preparation of this conference. Our tremendous gratitude goes to Katharina Scheiter, Lieven Verschaffel and Marco Hessels who took time in their busy schedule and agreed to deliver a keynote speech, as well as to all the people who play the role of session chair and to the members of the junior researcher award committee.

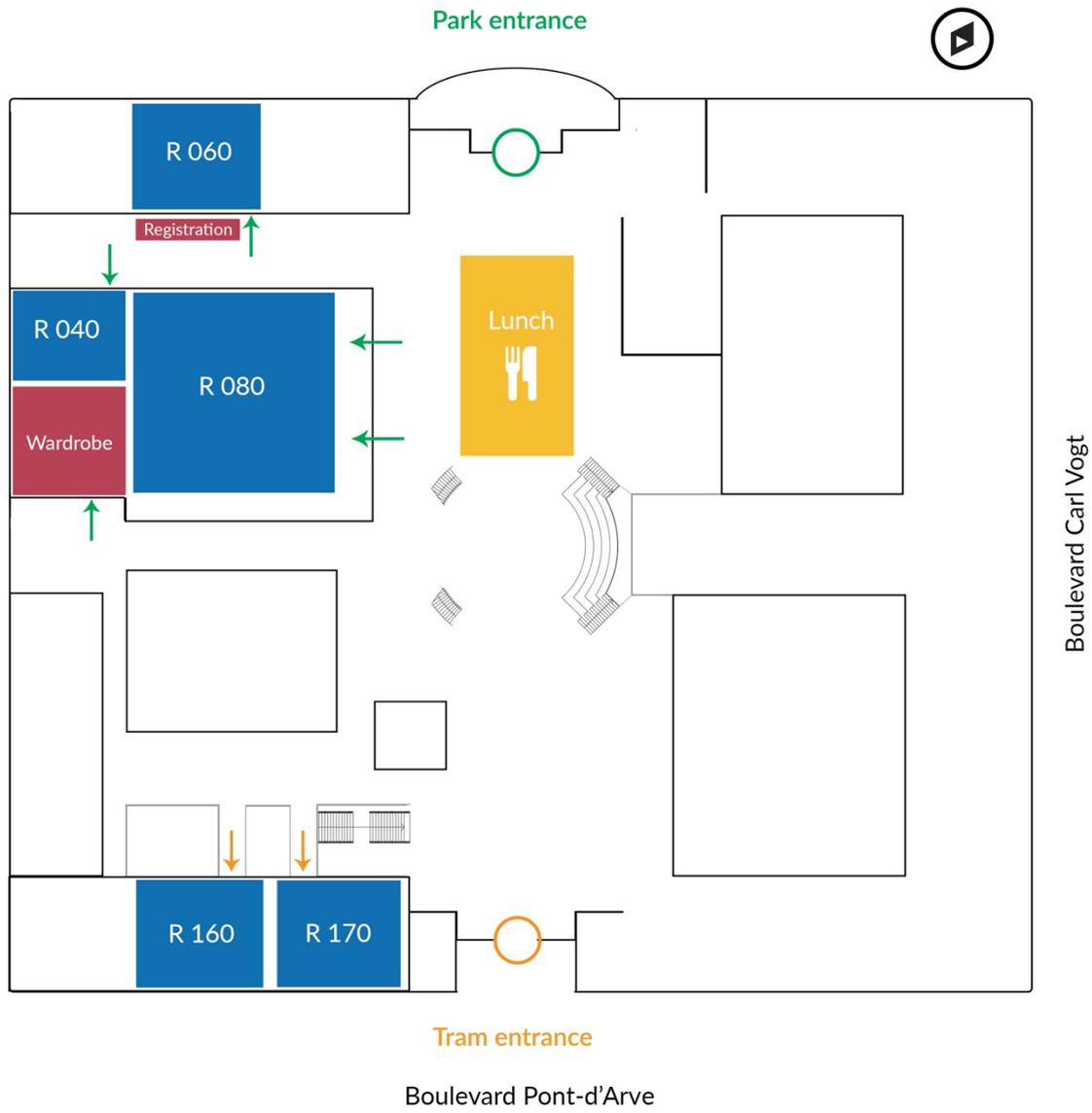
Finally, a big thank to the organizing committee and the onsite team: without your incredible help, this SIG 2 meeting would never have happened!

To all the participants, we hope you enjoyed the experience as much as we did.

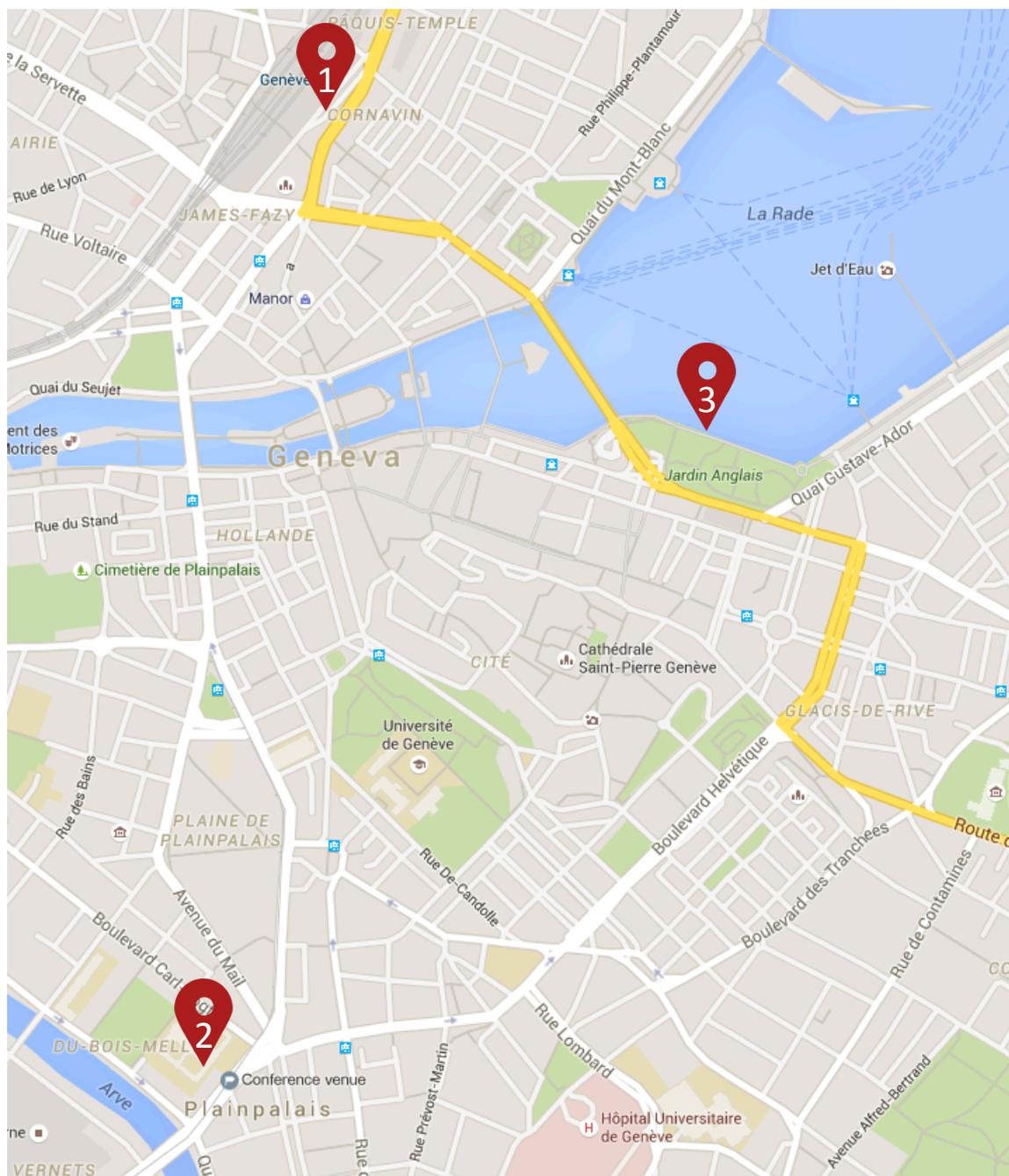
Mireille Bétrancourt, Sandra Berney & Juliette Désiron

# Venue Map

## 1. Uni Mail building



## 2. Points of interest during the venue



- (1) Train station “Cornavin”
- (2) Conference venue: Uni Mail
- (3) Gala dinner departure - CGN dock “Jardin Anglais”

## Practical information

### 1. Conference venue 🏛️

All the keynotes and paper presentations will take place at ground level, in lecture rooms R 080 and R 060. The parallel sessions (Monday from 13:30 to 15:00), will take place in three adjacent rooms at ground level (R 060, R 160 and R 170). The poster session on Tuesday (13:30 to 15:00) will be at ground level, in the Lunch area.

You will be able to store your luggage on Monday and Wednesday in the 'Wardrobe'. Coffee and lunch will be served in the Lunch area, near the Park entrance. Lunch will be offered in buffet or take-away bags, so you can eat your lunch either in- or outside.

### 2. Proceedings 📄

All proposals that are presented at the conference have been put on the memory stick that you will find in your conference bag. A full program including abstracts is provided on the website and in this conference guide (p. 8).

### 3. Reception 🍹

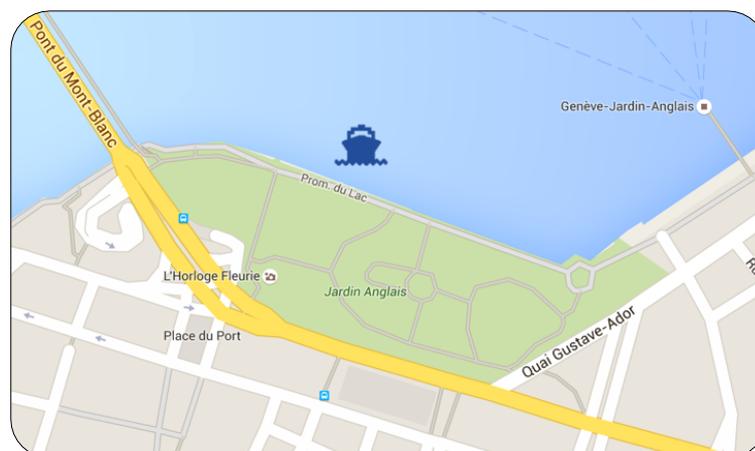
Monday evening from 19:00 to 20:00, you are invited to our opening reception with drinks and little snacks that will take place in the yellow lunch area on the ground floor, Park side.

### 4. Members meeting 🐾

You are all invited to join our yearly SIG 2 Members meeting on Monday, from 18:00 to 19:00 (in R 080). During this meeting we will look back at the previous year and inform you of future SIG 2 activities, such as the EARLI 2017 Conference in Tampere, Finland.

### 5. Conference dinner 🍽️

On Tuesday from 18:45 to 23:00, you are invited to the conference dinner that will take place on a cruise boat, departing from the dock: "Jardin Anglais". Conference guides will depart from the conference venue to walk you to the departure site at 18:00.



## 6. Wifi

### **eduroam**

If your home University is a member of the eduroam project, you can connect to this wifi by using the identifier and the password supplied by your organization.

Make sure to have your computer, mobile phone or tablet configured beforehand.

### **guest-unige**

Once connected to this wifi you will be redirected towards a portal to register or authenticate. For your first connection, type in your mobile phone number, then click “register”. You will receive a text with a code. Enter the code in the portal next screen and click “login”. This code is valid for 6 months.

## 7. Guided city tour

On Wednesday afternoon, after the conference, a guided tour of Geneva city center will be offered. If you would like to join, please subscribe at the information desk.

## Program Overview – SIG 2 meeting 2016

	Time	Activity	Page
Monday, July 11 <sup>th</sup>	8:30 - 9:15	Registration	
	9:15 - 9:30	Opening & Welcome by Conference Chairs (R 080)	
	9:30 - 10:30	Paper session A (R 080) – chair: Tina Seufert	1
	10:30 - 11:00	<i>Coffee Break</i>	
	11:00 - 12:30	Paper session B (R 080) – chair: Jean-Michel Boucheix	2
	12:30 - 13:30	<i>Lunch Break</i>	
	13:30 - 15:00	Parallel sessions	3
		Roundtable (R 040)	
		Workshop I (R 170)	
		Workshop II (R 160)	
	15:00 - 16:00	Keynote I : Marco Hessels (R 060)	4
	16:00 - 16:30	<i>Coffee Break</i>	
16:30 - 18:00	Paper session C (R 060) – chair: Alexander Eitel	5	
18:00 - 19:00	SIG 2 Member Meeting (R 060)		
19:00 - 20:00	" Welcome drink " reception ( <i>Lunch area</i> )		
Tuesday, July 12 <sup>th</sup>	9:00 - 10:30	Paper session D (R 060) – chair: Marije Van Amersvoort	7
	10:30 - 11:00	<i>Coffee Break</i>	
	11:00 - 12:30	Paper session E (R 060) – chair: Alfons Maes	9
	12:30 - 13:30	<i>Lunch Break</i>	
	13:30 - 15:00	Poster session ( <i>Lunch area</i> ) – chair: Mireille Bétrancourt	11
	15:00 - 16:00	Keynote II : Lieven Verschaffel (R 060)	22
	16:00 - 16:30	<i>Coffee Break</i>	
	16:30 - 18:00	Paper session F (R 060) – chair: Erica de Vries	23
	19:00 - 23:00	Conference dinner ( <i>cruise boat</i> )	
Wednesday, July 13 <sup>th</sup>	9:00 - 10:00	Paper session G (R 080) – chair: Richard Lowe	25
	10:00 - 10:30	<i>Coffee Break</i>	
	10:30 - 11:30	Paper session H (R 080) – chair: Juliette Désiron	26
	11 :30 - 12:30	Keynote III : Katharina Scheiter (R 080)	27
	12:30 - 13:00	Junior Researcher Award & Closing (R 080)	
	13:00 - 14:00	<i>Lunch Break</i>	
	14:00 - 16:00	Guided tour (city center)	

## Monday 9 :30 – 10 :30 - Paper session A

### **1. *Compositional design of animation improves comprehension of complex dynamics - Richard Lowe and Jean-Michel Boucheix***

ABSTRACT. Learners have difficulty in decomposing conventionally designed animations to obtain raw material suitable for building high quality mental models. A composition approach to designing animations based on the Animation Processing Model was developed as a principled alternative to prevailing approaches. It provides learners with pre-decomposed material that is structured and sequenced to facilitate the relation building required for effective mental model construction. Study of a compositional animation that presented material in a contiguous fashion resulted in higher quality mental models of a piano mechanism than non-contiguous or control (conventional) versions. Eye fixation data indicated that the compositional animation led to superior mental models because it particularly fostered relational processing.

### **2. *Does Drawing Support Monitoring and Control Processes During Learning from Text? - Katrin Schleinschok, Alexander Eitel and Katharina Scheiter***

ABSTRACT. The present research investigates whether a drawing task improves monitoring accuracy and takes a closer look at the link between monitoring and control processes during learning. Accurate monitoring is essential for controlling and regulating one's learning effectively. Monitoring accuracy can be improved by performing an active task after learning (e.g., drawing). In Study 1, we compared a condition with drawing task after each one of five text paragraphs with a control condition without drawing task. All participants made judgments of learning (Jols) for each paragraph and selected paragraphs for restudying. As expected, drawing improved monitoring accuracy (stronger link between Jols and performance) and increased the likelihood of restudying paragraphs that had not been understood (Jols more predictive for reselection). In Study 2 we investigated whether the drawing task would also lead to longer restudying of paragraphs that had not yet been understood, thereby fostering learning outcomes.

### **3. *Dynamic spatial abilities and learning from animations - Laurie Porte, Jean-Michel Boucheix, Mireille Bétrancourt, Richard Lowe and Patrick Bard***

ABSTRACT. This paper presents part of a wider project to create, validate and apply a comprehensive dynamic spatial ability test suitable for use with learning from animation. Four types of test item were devised (two race tasks and two intercept tasks) and tested with forty undergraduate participants. Absolute and relative speed of the objects as well as trajectory directions were manipulated. Task performances and the effect of the manipulated factors are reported. Comparison with a conventional static spatial ability test revealed little correlation, suggesting that dynamic spatial ability can be regarded as a distinct capacity.

## Monday 11 :00 – 12 :30 - Paper session B

### **4. *Getting the message across: The learning benefit of enthusiasm in online lectures – Huib Tabbers, Remy Reurling and Jelco de Kievit***

ABSTRACT. Does teacher enthusiasm benefit learning when students watch an online lecture? Although this intuitively seems to make sense, previous research with video material only found effects on perceived learning, and not on actual learning. In our study, 74 participants watched a short online lecture about the life of Ernest Hemingway in their home setting. In the Enthusiastic condition, the non-verbal expressiveness of the lecturer was high, whereas in the Unenthusiastic condition, gestures and vivid intonation were absent. The participants in the Enthusiastic condition rated the lecturer higher on enthusiasm, effectiveness and induced interest. And although their perceived learning was comparable to the Unenthusiastic condition, their performance on the actual achievement test was much higher. Thus, especially in naturalistic settings, teacher enthusiasm does seem to matter for learning from online lectures.

### **5. *The Role of Cultural Background in the Personalization Principle: Experiments with Czech Learners - Cyril Brom, Tereza Hannemann, Tereza Stárková, Edita Bromová & Filip Děchtěrenko***

ABSTRACT. Supplementing multimedia learning materials with instructions in a conversational style rather than a formal style can facilitate learning. This is the so-called personalization principle. We investigated whether a specific language/cultural background could present a boundary condition for this principle. Across four experiments with a Czech sample (N = 278), we failed to find the superiority of instructions in a conversational style ( $d = 0.07$ ) in the context where this superiority has been clearly demonstrated for US samples (i.e., short instructional animations; college and high school audiences). Twenty-nine percent of participants who received the conversational instructions expressed explicit reservations regarding the instructional style. The results demonstrate that language/cultural backgrounds indeed present a boundary condition for the personalization principle. The findings can be explained by the generally more formal approach to education in the Czech Republic compared to the US schooling system.

### **6. *Investigating Verbal Redundancy in Learning from an Instructional Animation - Charlotte Van Hooijdonk & Bjorn De Koning***

ABSTRACT. The redundancy principle states that presenting the same words in a narration and as on-screen text hinders learning. However, recent research shows that when redundant verbal information is presented to narrated multimedia presentations as on-screen labels, there is greater learning than when the complete verbally redundant text is presented. The present study extends this line of research by focusing on the usefulness of on-screen labels in an animation explaining a procedural task. The experiment had a 2x2x2 between-subject design (N = 129) with narration (yes vs. no), written text (yes vs. no), and on-screen labels (yes vs. no) as factors. Participants studied a first-aid procedure from an animation after which they performed and described the procedure. It is concluded that learning performance increased when the animation was presented with verbal information. On-screen labels improved learning, especially together with narration, but not more than when complete verbal redundant information was provided.

**7. *Expanding the Definition of the Expertise Reversal Effect: Task Features and Content Features Also Interact with Learner Knowledge – Jennifer Cromley***

ABSTRACT. The expertise reversal effect in multimedia learning has been defined as a stimulus-design x learner knowledge interaction: the effect of design decisions about the multimedia stimulus differs depending on the knowledge level of the learner. In this literature review, I look closely into this research and find that some studies actually vary the task that learners complete, while holding the stimulus design constant, yielding task x knowledge interactions. Other studies actually vary the content over time, while holding the stimulus design constant, yielding a task x knowledge interaction. I conclude this synthetic review with ideas for how this perspective can enrich designers' training and practices, theory, and future research

## Monday 12 :30 – 13 :30 – Roundtable & Workshops

- ***Demonstrating dynamics to support learning from complex animations – E-CIR Group***

ABSTRACT. This round table will explore the potential of learner demonstrations to be a more effective alternative support strategy than self-generated drawing for improving learning from complex animations. Discussion will be stimulated by three presentations reporting recent work of the EARLI Center for Innovative Research ‘Drawing for Learning from Animation’ and key focus questions arising from that research.

The presentations will cover the processing challenges posed to learners by requiring them to self-generated drawings from complex animations, how these challenges may be ameliorated by instead having learners perform demonstrations with manipulable models, and empirical investigations of the effectiveness of such demonstrations with respect to two different types of subject matter. Key themes for this round table are the central importance of extracting dynamic information to successful processing of animations and how learner demonstrations relate to the Animation Processing Model (Lowe & Boucheix, 2008).

- ***Constructive visualizations, digital design and fabrication – Daniel Schneider***

ABSTRACT. Physical visualizations (or physicalizations) can promote cognition through a variety of mechanisms, notably easier perception, hands-on manipulation and enhanced interaction with other participants. We can distinguish several types of physical visualizations, according to three dimensions: active/passive, kit/whole, digitally enhanced/non digital. In this workshop we will focus on two kinds of visualizations, non-digital construction kits and whole visualizations.

In this workshop we first will present the concepts of physical visualization and construction kit and discuss a few examples that are either teacher or learner-centric. Then we will introduce some technical principles of digital design and fabrication, before discussing the practical requirements for teachers and/or students to learn and use digital design and fabrication technology. Finally, we will engage participants in some prototyping activity.

- ***Meta-analysis – Sandra Berney***

ABSTRACT. Everything you ever wanted to know about meta-analyses. Well, almost ...!

With the expanding volume of literature, meta-analysis, a form of systematic review, has become indispensable in research. It is a set of statistical methods that combines and contrasts results obtained from independent studies, with the goal of identifying patterns or trends among study results, to address large-scale and complex scientific issues. Meta-analysis synthesizes the results of previous studies to produce more powerful conclusions.

This workshop provides an introduction to meta-analysis: basic information – not too much statistical details – on how to read and interpret meta-analyses

- what is meta-analysis
- how to conduct a meta-analysis
- searching for relevant research article
- data coding and extraction

## Monday 15 :00 – 16 :00 – Keynote I

- *In a relationship "understanding " is better than "pretty " and you can see it in the eyes! Using eye-movement registration for analyzing reasoning processes.*

**Marco Hessels, Faculty of Psychology and Education, University of Geneva, Switzerland & North-West University, Vanderbijlpark, South Africa**

ABSTRACT. Within the dynamic assessment paradigm, it is assumed that persons generally do not show their optimal performance in a test, because they do not fully understand what is expected from them and do not know which thinking processes they have to mobilize. Thinking processes may also be underdeveloped, because they have never (or rarely) been trained previously. This implies that persons may underperform on tasks, not because they are unable, but simply because implicit assumptions underlying test performance have not been met. Young children, for instance, regularly indicate they have chosen a certain response alternative, because it is pretty. However, the reasoning tests presume that the students pick the right answer, based on the application of reasoning processes.

In a dynamic assessment procedure, persons learn to engage in the processes needed for problem solving during training, and the intra-individual variability in effective use of these processes at posttest is indicative of the person's learning capacity. This assumption is based on the observation of augmented scores at posttest in the trained group. We used a computerized test of analogical reasoning, the Hessels Analogical Reasoning Test (HART) to evaluate the changes in analogical problem solving behavior as a result of training in primary school students with and without learning difficulties and adolescents with mild intellectual disability. Eye movement data made it possible to show that problem solving before training was often not guided by reasoning processes, but that the training indeed incited these persons to engage in the appropriate problem solving processes. At posttest, the students showed more structured inspection patterns, more "intelligent" comparisons and spent more time encoding the information in the matrix, thus confirming the construct validity of the dynamic posttest.

## Monday 16 :30 – 18 :00 – Paper session C

### **8. *The effect of attention cueing in molecular animation to communicate random motion – Jodie Jenkinson, Stuart Jantzen, Andrea Gauthier and Gael McGill***

ABSTRACT. Molecular animations are commonplace in today's undergraduate biology or chemistry classroom, while studies examining their efficacy report mixed results. This study examines techniques for calling attention to the random movements of two proteins within a crowded molecular environment, while simultaneously depicting a binding event. Participants (n=148) watched one of five animations with or without additional visual cues highlighting the movements of two binding proteins. We hypothesized that one of the four cued treatments (linear path, velocity vectors, ghosting, and heat map) would provide students with important insights about the stochastic nature of molecular events without impeding their ability to follow the binding process. Multiple choice pre and post-test measures were collected using iClickers. While additional cueing strategies did moderate participants' understanding of interactions they failed to correct prior conceptions relating to the stochastic nature of molecular environments.

### **9. *Reading graphs. The role of length and area in comparing quantities – Annemarie Quispel, Alfons Maes and Joost Schilperoord***

ABSTRACT. Studies investigating the usability of bar vs. pie graphs show contrasting results and researchers disagree about which perceptual features are primarily responsible for their effect. In two studies, we offer evidence for the role and the effect of two crucial perceptual features in reading graphs: length and area. In an evaluation study, we examined which features are actually perceived by non-expert users as representing quantity. Results show that their judgments are less clear cut than the assumptions of researchers. For most graphs, more than one feature was perceived to play a considerable role, and overall, area was perceived to play a more crucial role than length in the majority of graphs. The study provided us with a classification of graph types based on the role of these features. In a second study, we asked respondents to make simple and more complex comparisons between quantities in a graph. Performance was more accurate and efficient with length than with area representing quantity, but only in complex comparisons.

### **10. *Heart Rate Reactivity and Text Comprehension as a function of Reading Goals – Sara Scrimin, Martina Ferrante and Lucia Mason***

ABSTRACT. The relationship between physiological responses during reading and text comprehensions has received very scant attention. The present study aimed to examine undergraduates' heart rate reactivity while they read a science informational text in one of two reading goal conditions: to read for themselves or to read to answer to at least 50% of the post-reading questions to gain course credit. Gender, prior knowledge, topic interest and self-perception of knowledge, and final grade at the end of high school were also considered as control variables. Findings revealed that in the reading condition focused on good performance, students had larger heart rate reactivity reflecting physiological arousal, a component of engagement. They also comprehended the text better. Moreover, it emerged that the cardiovascular response to text reading partially mediated the effect of reading goal condition on text comprehension.

### ***11. Generating Titles to Decorated Graphs – Irit Aharon and Billie Eilam***

ABSTRACT. Decorated graphs are commonly used for communicating quantitative information in mass media and school textbooks. The present study investigated the possible effect of pictorial decorations on students' self-generated titles for given graphs. Four groups of 8th graders participated in the study (total N=120 boys and girls). All groups received the same set of graphs comprising pie, bar and scatter graphs. Three groups received decorated graphs and one (control) received plain graphs. No differences in mean title scores were found between research and control groups. Nevertheless, differences in performance patterns between low-medium achievers and high achievers suggest a possible hindering effect of decorative elements on students graph comprehension. These findings bear direct implications for the design of learning materials.

**12. Reading attitudes and text comprehension of Finnish and Spanish pupils: a comparative study - Ruth Villalon, Tuula Merisuo-Storm, Angeles Melero, Belen Izquierdo-Magaldi and Marjaana Soininen**

ABSTRACT. Positive attitudes towards reading have been associated to better text comprehension. However, research has not been conclusive enough about this issue, especially at the beginning of the schooling. This work focuses on the literacy attitudes of pupils from two different countries just at the time when they start to learn to read. The participants were 1257 first and second graders from Spain and Finland. Results show that, in general, pupils hold a positive attitude towards literacy. However, girls tend to hold more positive attitudes than boys and first graders than second graders in both countries. Furthermore, Spanish pupils maintain more positive attitudes than their peers in Finland. However, reading attitudes are not related to reading achievement neither in Spain nor in Finland. From these findings, some educational implications are discussed.

**13. Resolving Expert Disagreement – Alexandra List**

ABSTRACT. This study examined how participants reconciled disagreements between experts on two controversial technology topics (i.e., whether or not employers should base management decisions on employees' social media accounts; the benefits and drawbacks of video games in the classroom). Three profiles of reconciling expert disagreement were identified. Participants either (a) ignored expert disagreement, (b) acknowledged expert disagreement and ultimately decided in favor of one position or another, or (c) qualified experts' positions to reconcile conflict. The mode of reconciling expert disagreement was found to be associated with participants' epistemic beliefs about authority as the sources of knowledge. Further, mode of reconciling expert disagreement was found to be associated with participants' certainty in their own position, following reading two conflicting expert texts.

**14. Visualizations of cultural symbols and values in a reward allocation task - Emeline Ah-Tchine, Erica de Vries, Neil Schwartz, Ulrich Ludewig and Anna Bartel**

ABSTRACT. Research has not focused on possible side effects, on learning or problem solving, of seemingly trivial illustrations in textbooks. In this study, we question the influence of visualizations of cultural symbols and values in a reward allocation task. Participants were exposed to visualizations which represented American or neutral cultural concepts, in conjunction with the principles of distributive justice: equity or equality. Participants then completed a reward allocation task. The results showed an influence of American cultural symbols on the outcome of reward allocation but when no distributive justice principle was involved. However, visualization of the principles of distributive justice did not have the expected effect on reward allocation. More research is needed to investigate the influence of these types of visualizations and to define their role in task performance.

***15. Learning with Multiple Representations in Ray Optics: A Contribution to Understanding Basic Concepts - Rosa Hettmannsperger, Andreas Müller, Wolfgang Schnotz and Jochen Scheid***

ABSTRACT. A particular difficulty in physics learning is the fact that pupils' "intuitive" concepts are often resistant to instruction. Two quasi-experimental conditions (TG A and B) were implemented (N = 511), that differed with regard to the extent of cognitive activation while dealing with multiple representations and widespread intuitive concepts. Both conditions were compared with each other as well as with the results of a control group (CG C) learning with conventional tasks (N = 218) provided by a related study II. Results from multilevel analysis indicated that tasks addressing widespread intuitive pupils' concepts improved conceptual understanding significantly more than conventional task showing medium-term stability.

**16. Mental Comparisons of Magnitudes: Numerical vs. Graphical Format - Martin Galilee, Erica de Vries and Neil Schwartz**

ABSTRACT. Like numbers, lengths, and durations, values of energy consumption are magnitudes. A magnitude can be presented in graphical or numerical format. Numerical and offline cognition research suggest that presentation format affects internal representations and offline cognitive processes, making different formats better suited for different tasks. In an empirical study on 92 participants, we determined that presenting energy consumption in a numerical format was better suited for direct recall, whereas a graphical format was better suited for offline mental comparisons. This confirms the hypotheses and suggests the use of graphical rather than numerical presentation formats for energy consumption.

**17. Influence of Appearance-based Trait Inferences of Candidate Facial Morphology on Comprehension of Conflicting Text Content – Anna Bartel, Neil Schwartz, Neil Jacobson and Janina Lehmann**

ABSTRACT. Research has shown that a political candidate's success is based on a decision that takes less than one tenth of a second to make. Voters can make these quick judgments about political candidates based on their facial morphology—specifically, competence. The perception of facial competence is the strongest predictor of electoral success, which suggests that voters rely heavily on facial appearance when deciding which candidate to vote for. The present investigation aims to specifically analyze how the competence and gender of a political candidate combined with the competence and gender of the candidate's competitor influences perceptual measures such as overall impression, and candidate characteristics remembered; as well as behavioral measures such as the magnitude of a financial donation to a candidate's campaign. Results indicate that perceptions of a candidate are influenced by the competence level and gender of the competitor whom the candidate is competing against.

**18. Learning on Multi-Touch Devices: Don't Cover Texts and Touch Pictures Long Enough! - Birgit Brucker, Amelie Ehrmann and Peter Gerjets**

ABSTRACT. Prior research indicated that stimuli presented near the hands are processed differently: visuospatial processing is fostered, whereas semantic processing is inhibited. This follow-up study investigated this issue during multi-touch interaction. Participants interacted with paintings and texts on a multi-touch table and were randomly assigned to one of two conditions (hand-proximity: near vs. far). They either touched the objects directly (near) or manipulated the objects indirectly by touching placeholders of the objects (far). Moreover, the time of contact between the hands and the objects/placeholders (duration of touch) was considered. Results showed for learning about visuospatial information an interaction between hand-proximity and duration of touch: Visuospatial learning was fostered near the hands, but only for longer touch-durations. However, learning about semantic information was in this study in contrary to a previous study not influenced by the manipulation of hand-proximity. The results and implications for interactions on multi-touch displays are discussed.

***19. Signaling Text-Picture Relations in Multimedia Learning: The Influence of Prior Knowledge - Juliane Richter, Katharina Scheiter and Alexander Eitel***

ABSTRACT. The signaling principle states that highlighting correspondences in text and picture supports learning from multimedia materials. A recent meta-analysis with mostly lab studies revealed that the domain-specific prior knowledge of learners moderates the signaling effect. To investigate the influence of prior knowledge on the effectiveness of signaling in an ecologically valid context, we conducted a field study with 8th graders in schools. They learned either with a digital textbook containing mainly text signals or additional multimedia signals aiming at supporting integration of text and pictures (e.g., color coding, deictic references). Results revealed that low prior knowledge learners profited from multimedia integration signals whereas these additional signals were detrimental for the learning performance of high prior knowledge learners. This result is in line with the expertise reversal effect and might be relevant for the design of multimedia material and the usage of individualized instructions in digital learning environments.

## Tuesday 13 :30 – 15 :00 – Poster session

### **1. *Drawing the body: Medical students developing understanding of the heart - Dimitrios Panagiotopoulos, Shaaron Ainsworth and Peter Wigmore***

ABSTRACT. This study explores the use of drawing to assess medical students understanding of anatomy. 98 1st year medical students drew the features of the heart either pre or post whole body dissection. In addition, 46 3rd years on clinical placement were given the same instructions. Drawings were coded for informational content and for representations choices. We predicted that 3rd years would score higher than 1st years and that dissection would improve drawings. Analysis by two [3 by 1] MANOVAs did not confirm these predictions. Whilst 3rd years drew the shape of the heart more appropriately, specific structures were less accurate, and 1st years drew the heart more accurately prior to than post dissection. We suggest that students came with expectations formed by textbooks and popular culture. Dissection did not immediately improve these inaccurate models; if anything it served to destabilize their understanding without replacing it with anything more correct.

### **2. *Comprehension of Infographics – Marije Van Amelsvoort, Naomi Kamoen and Janneke van der Loo***

ABSTRACT. Infographics combine text with images to represent complex data. Since combining text and pictures has proven to be fruitful for learning, infographics could be too. Although infographics are commonly used and said to be efficient, hardly any research has been done on how people use this combination of text and images to understand information. We don't yet know whether, and if so, how, infographics are able to give insight. We asked 128 participants to think aloud while trying to understand three infographics on environmental issues. Results of the think-aloud protocols will be presented in Geneva.

### **3. *Measuring Quality and Use of Reading Strategies: Development and Validation of Four Instruments - Mirjam Mekhaïel and Jean-Louis Berger***

ABSTRACT. We have developed four research instruments in the context of a study on reading strategies among first year university students. In order to assure quality and reliability when assessing strategy use, validated instruments are highly valued. Rubrics will be used to measure students' actual strategy use and its quality, whereas their perception of their strategy use will be measured through a self-report questionnaire. This presentation will describe the development and validation process of these instruments.

**4. *Learning from interactive visualizations in a multiple-representational algebra simulation game - Denise Sutter Widmer***

ABSTRACT. We investigated whether translating a problem into an equation can be facilitated by dynamic and interactive visualization for novice learners. A simulation game was designed to support students' learning by providing a concrete representation of a word problem that was related to an equation. Two experimental groups tested each one a different version of the game and were compared to a control group. In the Visualize Condition, students could visualize the relation between the concrete representation and an equation whereas in the Check condition, the learners could verify an equation but without linking it visually with the concrete representation. Other means of visualization were also provided to facilitate students' learning which proved to be efficient. The results show that the use of visualization tools dealing with one representation at a time, rather than two, lead to better understanding and learning of translating a word problem in an equation.

**5. *Revealing Visual Perception Processes and Representational Competence with Phylogenetic Trees as Models of and for Evolution - Inga Ubben, Sandra Nitz and Annette Upmeier Zu Belzen***

ABSTRACT. Modeling evolutionary relationships among organisms, phylogenetic trees can be either used as models of existing hypotheses or for the prediction of new hypotheses. Accordingly, they can be applied as medium and method, respectively, demanding different levels of model competence. Using and reflecting representations of these biology-specific models require representational competence. So far, studies indicate students being most often on a low level. As phylogenetic trees are highly visual representations, our aim is to investigate the consistency of students' visual perception and their verbal reasoning when working on tasks about evolutionary relationships. Furthermore, we examine the impact of the scenario in which a PT as a model is used on students' visual perception and verbal reasoning, respectively. Our study will uncover visual processes during tree reading and students' levels of representational competence when handling PTs either as medial or methodical models.

**6. *Studying the Relationship between Reading Motivation, Reading Comprehension and Student Characteristics in Secondary Education: a Secondary Analysis of Flemish PISA 2009 Data - Amélie Rogiers and Hilde Van Keer***

ABSTRACT. Given the limited number of studies addressing secondary school students' intrinsic reading motivation and reading comprehension and thereby the impact of student characteristics, the aim of the present study is to examine the relationship between intrinsic reading motivation and reading comprehension in secondary school students and to clarify whether this relationship is moderated by students' gender, educational track, socio-economic status, and home language. To pursue this aim, a secondary analysis was carried out on PISA 2009 data. More particularly, data of 4269 Flemish 15-year olds were examined by means of multilevel modeling. The results provide evidence for the significance of the relation between intrinsic reading motivation and reading comprehension. Further, girls, socio-economic advantaged students, and students in the general secondary education track reported higher levels of intrinsic reading motivation and reading comprehension. Home language was significantly and negatively related to students' intrinsic reading motivation, but not to their reading comprehension.

**7. *Impact of emotional prosody and individual interest in learning from instructional animation - Audrey Berthon and Mireille Bétrancourt***

ABSTRACT. While learning can elicit strong positive and negative emotions, learners' emotional and motivational dispositions during learning is believed to strongly affect learning outcomes. In this experimental study, 30 participants learned with one of two versions of an instructional animation offering an introduction animation to quantum physics. In the positive version, the commentary was narrated with a happy tone whereas in the neutral version, the narration was narrated with a neutral prosody. The participants' level of individual interest for Physics was measured prior to the experiment. The results showed that participants with high interest had better comprehension scores and experienced more positive and less negative emotions than participants with low interest. However, no effect of emotional prosody was found, except on frustration and interest.

**8. *Interpreting Data Graphics: Visual Clutter and Comprehension of Climate Change - Jordan Harold, Kenny Coventry, Irene Lorenzoni and Thomas Shipley***

ABSTRACT. Although graphics of data can support communication of complex scientific issues such as climate change, complex graphics can be difficult for non-experts to understand. Comprehension problems might in part be caused by visual complexity, such as visual clutter. Using a sort-task, we compared non-experts' judgements of comprehension difficulty of ten real-world climate science graphics with the visual clutter of the graphics, measured by subband entropy (N=38). We found strong agreement between participants' rankings,  $W=.473$ ,  $p<.001$ ; and a moderate to large positive correlation between visual clutter and perceived comprehension difficulty,  $T_c=.399$ ,  $p<.001$ , especially for abstract relational graphs,  $T_c=.622$ ,  $p<.001$ . Greater visual clutter was associated with greater perceived comprehension difficulty, suggesting that the degree of perceptual organization of a graphic influences cognition. The visual clutter of a graphic might therefore help predict difficulties when non-experts are tasked to quickly understand their content.

**9. *The role of comprehension ability in multimedia learning - Juliette Désiron, Mireille Bétrancourt and Erica de Vries***

ABSTRACT. Readers' ability to comprehend a text is often mistaken for their reading skills or for what they learn from a text and thus its assessment remains difficult. The aim of this research is to compare three tests currently used to assess text comprehension, in order to determine which test better predicts readers' ability to comprehend an explanatory instructional document. The material is a multimedia document including a text of high or low cohesion, with static pictures. This is an ongoing study for which data will be collected in spring 2016. The results will facilitate the assessment of readers' comprehension ability as a pre-test measure for future research in multimedia learning.

**10. *Tactile Pictures in the Tangible Illustrated Books for Blind People: A Brief Review of Cognitive Studies - Dannyelle Valente, Edouard Gentaz and Anne Theurel***

ABSTRACT. The creation of tactile pictures for blind people is a field that has seen some real progress over the last few years. The concept of “tactile picture” covers a whole range of devices which reproduce different kinds of visual content when touched, like paintings and illustrations in children’s picture books. Nevertheless, in order for these images to be used in pedagogy, they must, above all, be understandable. In this paper we present a review of cognitive studies about blind people’s comprehension of tactile pictures. These studies have been major contributors to our understanding of how our sense of touch works. They have also allowed us to define which material or formal properties are the most important in real objects, in order to help designers translate these elements into tactile illustrated books for blind children.

**11. *Instructional uses of hypervideos in Vocational Education - Alberto A.P. Cattaneo and Florinda Sauli***

ABSTRACT. In recent years the role hypervideo can play in fostering learning has considerably increased. Different scholars pointed out that the use of its interactive features can be a valuable instructional strategy to support learning. However, this strategy is often limited to individual settings, where students use it alone. Other uses of hypervideo for learning, as well as their implementation in authentic classrooms have been poorly investigated so far. This study aims to test four different instructional uses of hypervideo in vocational school contexts. Four classes (N=38) of first-year students from a clothing-design curriculum were involved, assigned to four conditions with respect to the use of hypervideo: plenary lesson, individual use, authoring the hypervideo in groups, and no hypervideo (control group). Results show that hypervideo represents an effective way to learn and an incentive for student's motivation and give useful indication for teachers/trainers willing to use hypervideos in their practice.

**12. *Critical thinking profiles and comprehension of multiple texts: a think-aloud study - Christian Tarchi***

ABSTRACT. This study explores the contribution of thinking style and critical thinking skills to the comprehension of multiple documents through a think-aloud procedure. Twenty-five Italian college students were assessed in terms of prior beliefs, topic interest, rational-experiential thinking, critical thinking skills, and topic knowledge. Then, they were asked to read six documents on flu vaccination and to think-aloud. Protocols were coded for reading comprehension and epistemic cognition activity. Students were also asked to write an essay on flu vaccination. We identified two profiles, experiential versus critical-rational thinker. Critical-rational students showed more epistemic activity when engaging with controversial texts, reported more sources in their essay on the topic, and showed better memory of the original sources than the experiential students did.

**13. Text and graphs in competence assessment: What are the implications of multimedia research for competence assessment? - Ulrich Ludewig and Katharina Scheiter**

ABSTRACT. We propose cognitive competence models of text and graph comprehension that are theoretically motivated and take depth of understanding, task content and the type of task response into account. The resulting items should address cognitive processes that are defined by the Construction-Integration Model (Kintsch, 1988) and Model of Text-Picture Integration (Schnotz & Bannert, 2003). The assessment of text and graph comprehension should include tasks that address cognitive processes specific to text and graph comprehension, such as mapping between different mental representations. We propose three cognitive competence models that put a focus on different cognitive processes. These cognitive competence models could contribute to the discussion on construct validity in educational assessment.

**14. Dynamic vs. Static Visualizations for Learning Procedural and Declarative Information - Savannah Loker, Erica de Vries and Amy Fox**

ABSTRACT. This study investigates the use of static vs. dynamic visualizations for learning declarative and procedural information about computer networks. Previous research has not provided a consensus on when dynamic and static visualizations are most appropriate for learning, however the literature points to differences between the two types of visualizations for the acquisition of declarative and procedural knowledge. The results of this study suggest that dynamic visualizations are more appropriate for learning a procedural task than static visualizations.

**15. Improving Learning with Texts by Learner-generated Drawing: Effects of Text Cohesion and Prior Knowledge - Julia Knoepke, Tobias Richter and Lukas Lutz**

ABSTRACT. Learner-generated drawing stimulates deep text comprehension and, thereby, promotes text-based learning. By drawing illustrations of text contents, learners actively engage in elaborative comprehension processes such as identifying knowledge gaps, drawing inferences, and comprehension monitoring. We assume that stimulating these processes is particularly beneficial for learning with low-cohesion texts, given that sufficient prior knowledge is available. The present study investigated the effect of learner-generated drawing as a function of text cohesion and prior knowledge. Learners were presented with a high- or low-cohesion text. Half of them were instructed to draw the text contents during learning. Learning efficiency was assessed via a multiple-choice test. Results suggest that learners benefit more from high- compared to low-cohesion texts. Moreover, learner-generated drawing improved learning with texts for learners with high prior knowledge. We conclude that learner-generated drawing promotes text-based learning by stimulating comprehension processes that draw upon learners' prior knowledge such as drawing knowledge-based inferences.

**16. *To read or not to read: children's comprehension of their own written texts – Moira Newton***

ABSTRACT. Abstract: The present study was a two phase, mixed methods study of children's writing with a quantitative phase followed by a qualitative phase. In the quantitative phase a test of children's metalinguistic awareness (MLA) was positively correlated to a test of writing achievement. The qualitative data consisted of a writing sample, concurrent think aloud and an interview. The qualitative data showed that children varied in their ability to comprehend and to reflect upon their own written texts. It seems that this ability to comprehend and reflect upon their own writing may be linked to children's writing attainment. Children who show increased MLA by comprehending and reflecting on their own writing at increased levels of sophistication were also better writers. The following poster reports on children's comprehension of their own texts.

**17. *Hearing the Melody means playing the Lyrics in your Head – Janina Lehmann, Neil Schwartz and Tina Seufert***

ABSTRACT. This study will investigate whether melody can function as an anchor for learning a song's lyrics. Processing lyrics and melody of a song simultaneously leads to two highly linked information systems in memory. Stimulating the melody should therefore activate the lyrics and foster retrieval. On the other hand, listening to another melody should make retrieval more difficult, especially when the other melody is linked with different lyrics. 80 participants are going to learn two different, carefully normed, songs with different melodies and lyrics. In the testing phase, the participants will answer questions to measure recall, two levels of comprehension, and the quality of their mental model. We empirically varied whether the participants listen to either the melody of the song about which they are answering questions, the other song, an unknown melody, or no melody. The post-test will be repeated after one week, with the same variation of the music.

**18. *Who and What to Trust When Selecting Between Different Sources of Information? A qualitative study of upper-secondary school students' justifications for multiple documents selections - Tonje Stenseth and Helge Ivar Strømsø***

ABSTRACT. The aim of the current study was to investigate upper-secondary school students' justifications for selections of multiple documents when solving an academic task (prepare a class presentation on two socio-scientific topics). We provided 25 students with 20 fictive documents on each topic and instructed them to select as many documents as they needed in order to solve the task. The documents varied in terms of task relevance and source credibility. We interviewed the students after the document selection and asked them to justify their selections. Analysis showed that the justifications could be divided into three prominent categories; 1) relevance, 2) source, and 3) topic familiarity with relevance mainly referring to the nature and norms of the task, source addressing author's expertise and intentions, and topic familiarity referring to how the selected documents either confirmed students' prior knowledge on the topic or, alternatively, provided supplementary information needed to solve the task.

**19. *Negative Effects of Irrelevant Information on Learning Disappear Because People Learn to Ignore the Content, Not Just the Location - Gertjan Rop, Peter Verhoeijen and Tamara van Gog***

ABSTRACT. A well-known finding in research on multimedia learning is that presenting unnecessary or irrelevant additional information hampers learning. However, eye-tracking research suggests that participants quickly learn to ignore irrelevant information with task experience. We established in a prior study that negative effects on learning indeed disappeared over time, but it is unclear whether people learn to ignore the location, or the irrelevant content. We therefore examined whether changing the location of irrelevant information after participants learned to ignore it, would reinstate negative effects on learning. Participants first learned ten words accompanied by meaningful or irrelevant pictures in two blocks of five words with the pictures always appearing at the same location. In the third block, the location of the pictures switched for half of the participants. Switching the location of the pictures did not affect test performance, which suggests that participants actively inhibit attending to irrelevant information.

**20. *Doubling down on refutations: The combined effect of refutation texts and graphics - Robert Danielson, Gale Sinatra and Lucia Mason***

ABSTRACT. Textbooks often pair texts with graphics in an attempt to increase interest, engagement, and learning from text. However, processing texts and graphics may require more cognitive effort than processing text alone. This may be problematic for students attempting to overcome misconceptions – previously learned information or conceptions that are scientifically inaccurate. Refutation texts have proven to be very successful at helping students overcome these misconceptions. In the present investigation, we wanted to extend the current literature on text-graphic processing to include both refutation texts and refutation graphics. In the present study, we presented students with either a refutation text or an expository text, and paired these texts with either a refutation graphic or an expository graphic. Results revealed that while the graphics failed to influence understanding, they nevertheless functioned to prompt students to identify the conflict with prior knowledge.

**21. *What are the effects of the introduction of a teacher's video in multimedia lessons? An eye-tracking study - Tiphaine Colliot and Eric Jamet***

ABSTRACT. The aim of this study was to evaluate the impact of the teacher's video on learning with online courses. Several studies have shown two possible effects of a teacher's video introduction. First, as video delivers more social cues than an audio explanation, it can motivate students to engage in a deeply process of information (social-cues hypothesis). Besides, the teacher's video can also distract students' visual attention from pedagogical content on-screen such as diagrams (interference hypothesis) in comparison with a spoken only presentation. Eye-tracker data showed that students spent only 25% of their time on the teacher's video when it was provided. No interference effect was observed on learning but a positive effect appeared on retention regarding spoken information.

**22. *Intercultural approaches in the teacher training: a global question – Myriam Radhouane***

ABSTRACT. This presentation is a part of a PhD project called: The place of intercultural approaches in the teacher training and teacher's work in Geneva. In this thesis we have one main objective, which is: analyzing how intercultural approaches and cultural diversity are integrated to the educational system of Geneva. This presentation will focus on the didactics 'training because we think that intercultural approaches must be global and not just a specific topic. Living in world of diversity implies thinking through diversity; therefore we imagine that texts and graphics must be adapted to this aspect. Didactics 'training can be a way for pre service teachers to learn how to adapt texts and graphics to a culturally diverse environment. Through interviews we aim to analyze how the didactics 'training in Geneva take account the cultural diversity factor.

**23. *Real-Time Emotional Awareness in Computer-Supported Collaborative Learning: Implementing Different Graphical Representations of Self-Reported Emotions – Mattia A. Fritz***

ABSTRACT. Emotions are known to play an important role in cognitive processes and social interactions. Computer-Supported Collaborative Learning (CSCL) is an engaging activity both at cognitive and social level and we may therefore assume that emotions play an important role in its outcome. The study of emotions in CSCL situations faces, though, methodological issues with respect to measuring and sharing emotions. The Dynamic Emotion Wheel (DEW) is a web-based application intended to overcome these issues and enhance emotional awareness. In the first cycle of development, attention was mainly given to the expression of emotions, whereas the present development focuses on the graphical representation of emotions. The idea is to test different configurations of the DEW – with respect, for instance, to individual vs. grouped graphical representation of emotions – and determine whether different ways of conveying awareness have different effects on group dynamics in CSCL settings.

**24. *Reading Strategies: a Comparison between Concept Mapping and Self-Questioning - Mirjam Mekhaïel, Marco G.P. Hessels and Benoît Galand***

ABSTRACT. Multiple studies have already shown the impact of concept mapping and self-questioning on learning and performance in educational settings, but they were never compared.. In this experimental research, these reading strategies will be studied among first year university students. By comparing a concept mapping strategy to a self-questioning strategy, we actually compare a visual to a verbal text processing strategy. During a six week period one group of students will learn how to use the concept mapping strategy whereas a second group will learn how to use the self-questioning strategy. Two control groups will be established as well: (1) the classic summarizing strategy; and (2) no intervention at all. Impact of the interventions will be measured during the first and last session and after one year.

**25. Eye Movement Modeling Examples as an Instructional Tool: The Influence of Model and Learner Characteristics – Marie-Christin Krebs, Anne Schüler and Katharina Scheiter**

ABSTRACT. In two experiments, we investigated whether the effectiveness of Eye Movement Modeling Examples (EMMEs) is influenced by characteristics of the learner and/or the model. In Experiment 1 (N=75), two groups received videos of an expert's eye movements on multimedia learning material demonstrating multimedia processing strategies. Before, they either were informed that the model was a successful learner or that the model was another participant of the experiment. A control group learnt without EMMEs. After learning all participants completed a posttest. Results indicated an interaction between learner and model characteristics: Only learners with lower prior knowledge profited from EMMEs, but only when no information regarding the model's competencies was given. These results contradict prior findings indicating that especially students with higher prior knowledge profit more from EMMEs. In Experiment 2 we currently investigate the influence of prior knowledge and other learner characteristics on the effectiveness of EMMEs in more detail.

**26. Truth is in the Eye of the Beholder: Investigating truthiness as a function of source trustworthiness and semantically related photographs – Alexander Stock, Neil Jacobson, Anna Bartel and Neil Schwartz**

ABSTRACT. Recent studies have demonstrated that a written trivia claim of an unknown veracity, paired with a semantically related photograph, results in judgment that the claim is true. This effect is known as "truthiness". Research on truthiness has been limited by two factors including, 1) only measuring written claims' veracity, and 2) ignoring source trustworthiness. Therefore, we designed a 2 (Photograph: present vs. absent) X 2 (Source Trustworthiness: High vs. low) experiment, to understand the interaction of semantically related photographs on audio statements of varying trustworthiness. Results indicate trustworthiness of the source did not impact perception of truth. In addition, results of a paired-samples t-test indicated that claims were more likely to be perceived as true when a photograph was present (versus absent),  $t(190) = 3.79$ ,  $p = .00$ . This finding provides evidence that "Truthiness" generalizes beyond a written message and can arise in an audio channel of communication.

**27. *The Influence of Colored Graphics on Decision-Making - Neil Jacobson, Neil Schwartz, Marie Lippmann and Anna Bartel***

ABSTRACT. Previous work conducted in our laboratory (Jacobson, Schwartz & Lippmann, 2013) indicated that color is not an arbitrary characteristic of graphics, but interacts with both the text it accompanies as well as the content in the graphic it depicts. Our previous investigation yielded significant and marginally significant results in line with, and contradictory, to existing literature. Therefore, we conducted a follow-up investigation. In three experiments, we aimed to address how the presence of a statistical graph influenced the construction of a learners' concept about a company. Experiment 1 revealed that the presence of an achromatic graph nullified the well documented framing effect. Experiment 2 revealed that the color green used to make the success portion of the graph salient resulted in stronger arguments against the company. Finally, Experiment 3 revealed that red used to make salient failure resulted in learners' describing more negative implications of the company's actions.

**28. *Effects of Text Structure and Different Media Forms on Attitude Change and Comprehension of a Social Issue: Structural Inequality in the Global Economy – Allison March, Neil Schwartz and Neil Jacobson***

ABSTRACT. Research has separately shown the positive effects rhetorical text-structure types and media forms have on comprehension. This study aims to examine the interaction between rhetorical text-structure and different forms of media on comprehension and attitude change. In this study we present two media forms, a documentary and a podcast describing the social topic: "Structural Inequality in the Global Economy". Each media form has one of two identical text structures, either narrative or problem-solution. Undergraduate students will be randomly placed in one of four experimental conditions. Comprehension will be measured by a Sentence Verification Technique (SVT) and attitude change will be assessed using the Implicit Association Test (IAT). It is predicted that the narrative text-structure in both media forms will have greater influence on both comprehension and attitude change, and likewise visuals in the documentary will increase comprehension and attitude change.

**29. *Drawing to learn: Is it essential to self-construct? - Steffen Schmidgall, Alexander Eitel and Katharina Scheiter***

ABSTRACT. We investigated the generative aspect and long-term memory effects of learner-generated drawing. To this end, we compared six experimental conditions in a 3x2 between-subjects design (drawing vs. animated author-generated drawing vs. mental imagery x immediate vs. delayed testing). Participants (N=204) read a text about human swimming behavior and then took three learning outcome tests. The animated group scored higher on the recognition test than the drawing group but the mental imagery group did not differ from the other groups. The drawing and the animated groups scored higher on the visual-spatial representations test than the mental imagery group. Initial test scores were higher for the recognition and the visual-spatial representations tests than the delayed test scores. No differences were found for the transfer test. More perceived difficulty of the learning material was reported by the drawing group, indicating these participants could not use enough cognitive resources to engage in meaningful learning.

**30. *Title Concreteness and Text Comprehension: A Cross-Cultural Investigation - Marie Lippmann, Neil Jacobson, Hermann Körndle, Neil Schwartz and Susanne Narciss***

ABSTRACT. Two experiments investigated the effects of title-concreteness (more concrete vs. more abstract) on ease-of-comprehension (EOC) and comprehension test performance in American and German students. The studies were rooted in the Dual Coding Theoretical Model of Reading (DCTR) which proposes that concrete language fosters text comprehension by inviting referential processing during reading. In accordance to DCTR, we predicted that more concrete titles would cue referential processing and foster EOC and comprehension test performance in both participant samples. The results provided partial support: Students in both samples expected texts with more concrete titles to be easier to comprehend, but only German students experienced the expected increase in EOC from before to after reading. There were no differences in comprehension test performance in either sample.

**31. *Self-Critique of Invented Representations of Human Movement - Billie Eilam and Shlomit Ofer***

ABSTRACT. Critiquing is an essential meta-representational competency. We designed a unique, long-term environment that triggered novel kinds of critique criteria, partially different from those reported, enabling a deeper understanding of the critique aspect of MRC. Over a year, fourth graders (N = 16) invented visual representations for 11 increasingly complex demonstrated human movement sequences. A decipherer decoded these “scripts” back into motoric performance (without seeing the original sequence). Subsequently, the inventors identified problems in their scripts (implicit critique), devised appropriate solutions for them, and modified their scripts accordingly. Implications to MRC development and educational experiences are discussed.

**32. *Investigating Text-Picture-Integration during Multimedia Learning – Anne Schüler***

ABSTRACT. A paradigm from text comprehension research was adapted to multimedia learning to test whether text-picture integration occurs already during processing the materials. In Experiment 1, it was varied whether the information conveyed through text and pictures was consistent (control group) or whether the information conveyed through text and pictures differed on two out of 24 slides (experimental group). Analyses of gaze behavior during learning revealed that the control and experimental group did not differ regarding slides containing consistent information in both conditions. However, when inconsistent information was presented in the experimental group, learners spent more time on slides, had longer fixation times on text and picture, and had more revisits to text and picture than the control group. These data pattern was replicated in Experiment 2 with other learning materials. These data indicate that text-picture integration already occurs during processing multimedia materials.

- *Get the picture? On the role of illustrations in the solution of mathematical word problems*

Lieven Verschaffel, *Center for Instructional Psychology and Technology, University of Leuven, Belgium*

ABSTRACT. Mathematical word problems take a prominent place in learners' elementary and secondary mathematics curriculum worldwide. Optimally, they fulfil the role of genuine mathematical modeling tasks, wherein the learner has to develop and work through a mathematical model of the situation described in the problem text with a view to find a situationally meaningful solution. Many learners experience great difficulty with word problems, already from the beginning of their school career. Research has revealed that most difficulties occur in the first stages of the problem solving process, wherein the learner has to build an understanding of the situation described and to construct a mathematical model describing the essence of the relevant elements and relations embedded in the situation. A frequently used instructional technique to help learners through these initial phases of the solution process, is to complement the text with a graphic representation (a picture, a drawing, a diagram...) that is either given to or constructed by the learner. In this lecture, I will provide a critical overview of the research literature on the impact of these various representations on learners' word problem solving processes and outcomes. Attention will be paid at the underlying theoretical models, research methods, empirical outcomes, and educational implications. The review will show that a proper understanding of the role of these various kinds of graphic representations for various kinds of word problems requires an integration of insights from the disciplines of cognitive psychology and mathematics education.

**19. *The impact of the position of the picture on strategies of consultation of learning document – Natacha Métayer and Eric Jamet***

ABSTRACT. This study explores the impact of the position of the picture beside text on the screen (i.e., on the left vs. on the right). The results show no difference between the two conditions for learning performance. However, differences emerge concerning the eye movements' strategies during the consultation. Thus, from a general point of view, learners in both conditions consult the document from left to right, but, from a specific point of view, learners don't consult the two sources of information (i.e., picture or text) in the same order.

**20. *How to improve learners' emotional experiences in multimedia learning environments: Effects of emotional design and induced achievement goals - Marie-Noëlle Andrey, Valérie Brunisholz, Bruno Dos Reis and Gaëlle Molinari***

ABSTRACT. We investigated whether the emotional design effect in multimedia learning varies depending on learners' achievement goals. Before reading, specific instructions were used to orient learners toward either mastery or performance goals. Learners were then asked to study a multimedia document with either a neutral or a positive design. Results showed that the positive design promoted positive emotions and motivation only when learners were oriented toward mastery goals.

**21. *Implementation Intentions to Process Pictures Early Foster Comprehension – For Those Who Follow Them - Alexander Eitel and Katharina Scheiter***

ABSTRACT. Previous studies used sequential presentation designs to show that students who processed picture before text outperformed students who processed text before picture. The present study used a more naturalistic way of presenting text and picture to students (simultaneously) to test beneficial effects of early picture processing. Participants (N=85) learned about how polar lights develop and early picture or text processing was stimulated by means of implementation intentions. They were prompted to study 'picture first', 'text first', or none of both (control) using implementation intentions as instruction. Results showed that 'picture first' participants fixated the picture longer in the beginning of each page and had better learning outcomes than participants in the 'text first' condition (if the intentions were followed). Hence, early picture processing could be stimulated by implementation intentions which proved to be effective for learning, although text was presented concurrently.

**22. Reading Argumentative Texts: Comprehension and Evaluation Goals and Outcomes - Irene-Anna Diakidoy, Melina Ioannou and Stelios A. Christodoulou**

ABSTRACT. The study examined the influence of reading goals and argument quality on the comprehension and evaluation of extended argumentative texts. Young adult readers read to comprehend or evaluate texts on two different controversial issues. Text versions varied with respect to the quality of the arguments included, but not in terms of argument content. The sample's familiarity with the text topics was low and prior beliefs ranged from consistent to inconsistent with the texts' main claims. The results indicated that an evaluation goal had a consistent positive effect on main claim and text recall when compared to comprehension goal. Argument quality, however, had no effect on text evaluation. The findings support a dissociation between the elaboration underlying comprehension and that involved in the critical evaluation of arguments in line with a dual-process account of thinking.

**23. Context effects in multimedia learning - Tina Seufert, Jurij von Randow and Ulrike Magner**

ABSTRACT. Learning with text and pictures is better than learning with texts alone. This so called multimedia principle is well known and often approved with respect to better learning outcomes. In our study we additionally focus on motivational effects, especially learners situational interest and on context effects. Hence, in an experiment (n=48) we analyzed whether learner's situational interest and learning outcomes depend on either the learning material (text versus text with pictures) or the context, i.e. whether a neighbored learner has more or less interesting learning material (with or without colored pictures) or an interaction of both. We found main effects of the learning material with better learning outcomes and higher interest ratings for texts with pictures. Unexpectedly, we found no significant interaction with the context. Only on a descriptive level, participants rated their own material as especially more interesting or uninteresting when their neighbor had different material.

**24. How much help do you need? Investigating the role of support for learner-generated drawing - Steffen Schmidgall, Alexander Eitel and Katharina Scheiter**

ABSTRACT. Learner-generated drawing may be a task that is too demanding when learners draw on blank paper and receive no support. Therefore, we investigated the role of support and the influence of learner characteristics on drawing, contrasting three drawing groups with different degrees of support (no vs. low vs. high support) with a non-drawing control group. Currently, the data of N=140 university students has been gathered. Participants first answered the Verbalizer-Visualizer Questionnaire (VVQ), before they read a text about human swimming behavior and then took three learning outcome tests. We expected the low and high support groups to outperform the no support group and the latter to outperform the control group. We also expected a negative relation between the perceived difficulty of the learning material and the degree of support in the drawing groups. We expected Visualizers to benefit more from drawing than Verbalizers. Results will be presented at the conference.

**25. Enhancing Learning with Text and Diagram by Combining Prompting with Practice Testing – Jonathan Fernandez and Eric Jamet**

ABSTRACT. Elaborating a coherent mental model from complex scientific multimedia document involves students to be engaged in deep learning activities. Several studies have shown that prompting can be used to overcome students strategies production deficit. However, studies have shown that not all students complied to prompting. We hypothesized that overconfidence could be the cause of prompting intervention failure. To test this hypothesis, we consider the practice testing technique as a monitoring recalibration tool to potentiate prompting intervention. 84 first year undergraduates were instructed to learn a complex neurology course from a multimedia lesson that included or not 1) regular practice testing 2) regular prompting instruction. Results showed that prompting and testing triggered the use of efficient cognitive and metacognitive processes resulting in learning gain. Furthermore, results showed an interaction between our two independent variable on cognitive and metacognitive processes use demonstrating that practice testing has the power to potentiate instructional prompting.

**26. Does animation enhance learning? A meta-analysis. – Sandra Berney and Mireille Bétrancourt**

ABSTRACT. This meta-analysis investigated whether animation is beneficial overall for learning compared to static graphics, while also identifying moderator factors affecting the global effect. A systematic search was conducted for experimental studies comparing the impact of animated vs. static graphics displays in the context of knowledge acquisition. A total of 50 papers were considered, and consecutively 61 primary studies (N = 7036), yielding 140 pair-wise comparisons of animated vs. static graphic visualizations in multimedia instructional material were analyzed using a random-effects model. An overall positive effect of animation over static graphics was found, with a Hedges's g effect size of 0.226 (95% confidence interval = 0.12 – 0.33). As the heterogeneity was high, moderator analyses were explored.

**27. Does Congruency of Text and Pictures Affect Memory for Verbal Information in Video Clips? – Martin Merkt**

ABSTRACT. We investigated whether congruency of spoken text and pictures affects learners' memory for verbal information in video clips. Sixty-one participants watched video clips with verbal information that was semantically congruent or incongruent with pictures of historical persons. After a delay of 10 minutes, participants were asked to verify information from the clips that were either attributed to the correct or to an incorrect person. In line with our hypothesis, participants were better able to reject incorrect information that was incongruent with the picture than incorrect information that was congruent with the picture. However, there was no effect of congruency on verifying the correct information. It is argued that rejecting incorrect information needed an additional cue (i.e. congruency) so that the criterion for rejection was reached, whereas no such cue was necessary for the verification of correct items.

**28. Instructing learning strategies to support learning with static and dynamic visualizations – Emely Hoch, Katharina Scheiter and Peter Gerjets**

ABSTRACT. As learners often struggle when learning with static or dynamic multimedia, instructional support for text-picture comprehension was tested. Dynamic visualizations are cognitive demanding because information is transient. Therefore, instructions to use adequate learning strategies should show a stronger effect on learning outcomes when learning with dynamic compared with static visualizations. Instructional support was given using implementation intentions. These are if-then-plans connecting a specific situation with goal directed behavior to foster goal achievement. After internalizing implementation intentions multimedia material with either static or dynamic visualizations was presented and learning outcome was measured afterwards. The hypothesis that instructional support should be especially effective when learning with dynamic visualizations could not be confirmed. The marginally significant main effect for visualization format – better learning outcomes when learning with dynamic than with static visualizations – is in line with previous research. Further research is needed evaluating the absence of an effect of instructional support.

Tuesday 11 :30 – 12 :30 – Keynote III

- *Integrating information from multiple representations: From basic research to designing digital textbooks*

*Katharina Scheiter, Head of the Multiple Representations Lab, Leibniz-Institut für Wissensmedien (IWM), Tübingen, Germany*

ABSTRACT. Many students show maladaptive study behaviors when learning from multiple representations. Rather than studying all representations in a balanced fashion, students often focus on only one of the representations (usually the text) at the expense of other representations. As a consequence, they also do not properly integrate information from the representations. In the first part of my talk I will report on studies that focus on the question of what is meant by integration. In particular, two sub-processes can be distinguished: (a) identifying correspondences between the representations and (b) mentally representing the information from the external representations and the referential connections between them in a coherent mental model. Since integration has been shown to be pivotal for learning success, the second part of the presentation will report on studies investigating ways of supporting learners in integrating text and pictures. In general, two different types of support can be distinguished: First, materials can be redesigned so that they facilitate the identification of correspondences. The shown examples range from small instructional units used in lab studies to comprehensive materials used in classroom settings (i.e., digital textbooks). A second approach relies on prompting or instructing learners to integrate – based on the assumption that while learners are in principle able to identify correspondences between representations, they often simply do not attempt to do so sufficiently.

