

Best conceptual work

Gary Klein – So, this isn't in human factors, but in terms of the quality to work its really is one of the classical pieces and that would be Karl Duncker's book *On Problem Solving* and you know just what it takes, under what conditions can you support people and encourage people to reframe, to get out of a current way of understanding something and adopt a new frame. What encourages people to remain fixated by a frame that's no longer working and what are the conditions that commit people and support people in breaking loose from that frame, I think that that work has great conceptual importance for the kinds of things that we do.

John Carroll – the one that I picked is the analysis of expert programming skill as patterns which is basically due to Beck, Cunningham, Gamma, Helm, Johnson, Vlissides and many others This has been a project mainly carried out in software engineering but we're asked for conceptual work, but it was extremely successful and has lead to a number of tools and also impacted ways that programmers are taught and its also a great example as I mentioned earlier of a middle level abstraction really working in the analysis of what is undeniably a complex domain of expert human endeavor though it doesn't involve real time issues, at least not yet, but I sort of pick pattern languages for programming

Nancy Cooke – I selected Hutchin's work *Cognition in the Wild* um as well as his paper on how cockpit knows it's speed, I think those have been clearly influential and have ah, they're very good about picking concrete examples, like sailing that can demonstrate the importance of structure in the environment and the fact that there is cognition in the environment, in the cockpit itself

Christopher Wickens – okay, well I picked Kahneman's really early work on effort and his wonderful little book *Attention and Effort* that stimulated me in graduate school and really gave my career a trajectory to look at effort in single task and multiple task performance. I think effort has been understudied in our profession. It's only been studied heavily maybe in the context of workload and that's only a small part of what it is and I guess I see effort coming up so much in terms of choices we make when we behave as sort of economical decision makers to choose to reduce effort rather than perhaps optimizing outcomes. That's the whole basis, of course, the heuristics approach of Kahneman and Tversky and ultimately led to their Nobel Prize so it's clearly put them on center stage, but effort enters into so many other choices we make. It enters into the choice of what feature to use on a computer system to minimize effort and it enters an awful lot into learning, learning and education which we'll come to in a moment and that is if we look at children, the children when they choose to put effort into a learning environment and when they choose not to has a tremendous difference on the amount of mastery they have for the material and a lot of this is related to I think an important phenomenon the generation effect, when you put the effort in to generating a response you tend to retain it better than if you just simply pass it up and watch it. So I think this concept of effort spawns off in so many different directions in terms of influencing human performance and cognition and I think Kahneman did a masterful job of putting it forth very early on and I'd like to see people keep working on it

Christopher Nemeth – other thoughts on conceptual work that's had a real influence, yes sir

Audience Member 1 – I'm not really familiar with the effort principles, but, what. Mister Wickens, what's your take on how effort plays, gives and takes with the whole games for training

Christopher Nemeth – question on how effort

Audience Member 1 – whole games for training is not a lot of effort

Christopher Nemeth – games for training interrelate

Christopher Wickens – are you saying it's not a lot of effort? I mean my take on that would be games for training are compelling and engaging causing people often times to invest the necessary effort to understand. If that effort is directed in the right direction to understanding the conceptual elements that the game is to be trained. That has to do with sort of the goal of effort in education which is, so I think you know, I think good games, good compelling games invite the necessary effort for learning and mastery of the skill.

Christopher Nemeth – yes sir

Audience Member 2 - as far as a good conceptual work probably Jerome Bruner's the *Narrative Construction of Reality*, how he

Christopher Nemeth – Jerome Bruner's and the *Narrative Construction of Reality*

Audience Member 2 – right and how a narrative is a tool to help us understand a world that's fundamentally different and more logical, and the reasoning approach we use to understand the world and Gary has done a lot of work in showing us stories are used in organizations to convey knowledge and help people make decisions

Christopher Nemeth – alright, so you're saying narrative as a way to understand the world. Great, thank you.